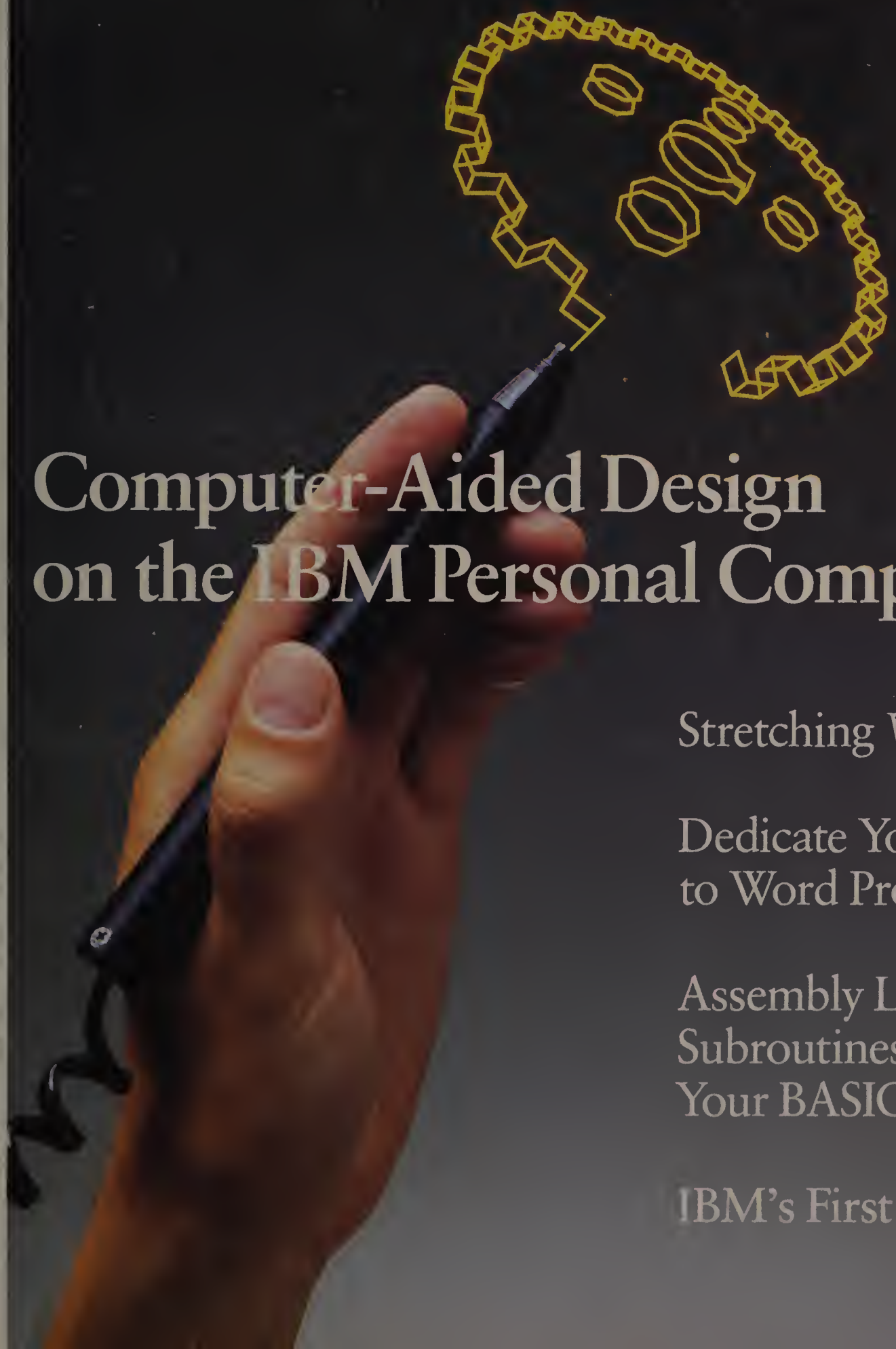
PC WORLD

October 1983
$3.00

$3.75 Canada
£1.85 UK

The Personal Computer Magazine for IBM PCs and Compatibles

Corona: Two New Compatibles



Computer-Aided Design on the IBM Personal Computer

Stretching *VisiCalc*

Dedicate Your PC to Word Processing

Assembly Language Subroutines for Your BASIC Programs

IBM's First Portable PC

TRUNKS FOR THE MEMORIES.



Introducing the most logical place to store Elephant Memory Systems® (or lesser brands of disks): The Trunk.

With its alphabetized library index, you can file or retrieve up to 60 disks, instantly.

The Trunk is made of durable molded plastic with a hinged, one-piece lid, to keep disks safe from dust, dirt, and other detriments which disks despise.

And, it's portable. Because the lid doubles as a carrying handle so your Elephant Memory Systems® disks can go anywhere you do.

There's a model for 5¼" and 8" floppies, as well as a cassette-and-game file and a special Atari® version.

So if you're looking for the best disk storage system on the market . . .

The Trunk is an open-and-shut case.

THE TRUNK. ENDORSED BY ELEPHANTS.

Elephant Memory Systems® Disks

A full line of top-quality floppies, in virtually every 5¼" and 8" model, for compatibility with virtually every computer on the market. Guaranteed to meet or exceed every industry standard, certified 100% error-free and problem-free, and to maintain its quality for at least 12 million passes (or over a life-time of heavy-duty use).

Marketed exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021. Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

Reader Service #91

INTRODUCING DATA BASE MANAGER II™ FROM ALPHA. IT'S FOR PEOPLE WHO HAVE THEIR OWN IDEAS ABOUT WHICH SOFTWARE SHOULD BE INTEGRATED.



Here's a proposition for you.

First thing tomorrow, throw out at least one of your favorite computer programs. Maybe your word processor. Maybe your spreadsheet. Maybe both. Just make sure it's something you like, and that you've spent some time learning it.

Now, start from scratch with programs you don't know. Ones that force you to give up features you depend on now.

Interested?

Well, if you plan to get in on the current "integrated" software rage, that's what you'll have to do. Because most integrated software systems only work with software from one manufacturer.

If you think that's too much to ask, then Data Base Manager II from Alpha is for you.

It starts by giving you an enormously powerful and elegantly approachable data base system. One that's menu driven and responds to simple, English-like commands. But one that's also truly fast. With all the advanced features you'd expect from a top-notch data base management system.

Plus, you get extended DBMS features like phonetic word search, built-in form letter, and date calculations. And a painless way to file data transferred to your PC from other micros, mainframes or information utilities.

And then it lets you do something else. It lets you totally integrate *your* word processor, and *your* spreadsheet program, instantly.

So you can quickly call up and manipulate any information. Then move it over to VisiCalc,® 1-2-3™ or Multiplan™ for calculations. Then shuffle it over to WordStar,® EasyWriter™ or Volkswriter™ for word processing. Without re-entering data. And without complex commands.

In fact, Data Base Manager II lets you integrate nearly any combination of the word processing and spreadsheet programs that run on the IBM PC or XT.

The prestigious software journal, *The Rosen Electronics Letter,* says Data Base Manager II's unique capabilities "unify some of the best of the productivity packages already on the market... This is a signal achievement."



You'll say that this is the way personal computing is supposed to work in the first place.

See the remarkable new Data Base Manager II today. Call us toll-free at 1-800-451-1018 (in Massachusetts call 1-617-229-2924 collect) for the name of the Alpha Software Dealer nearest you.

DATA BASE MANAGER II™ FROM

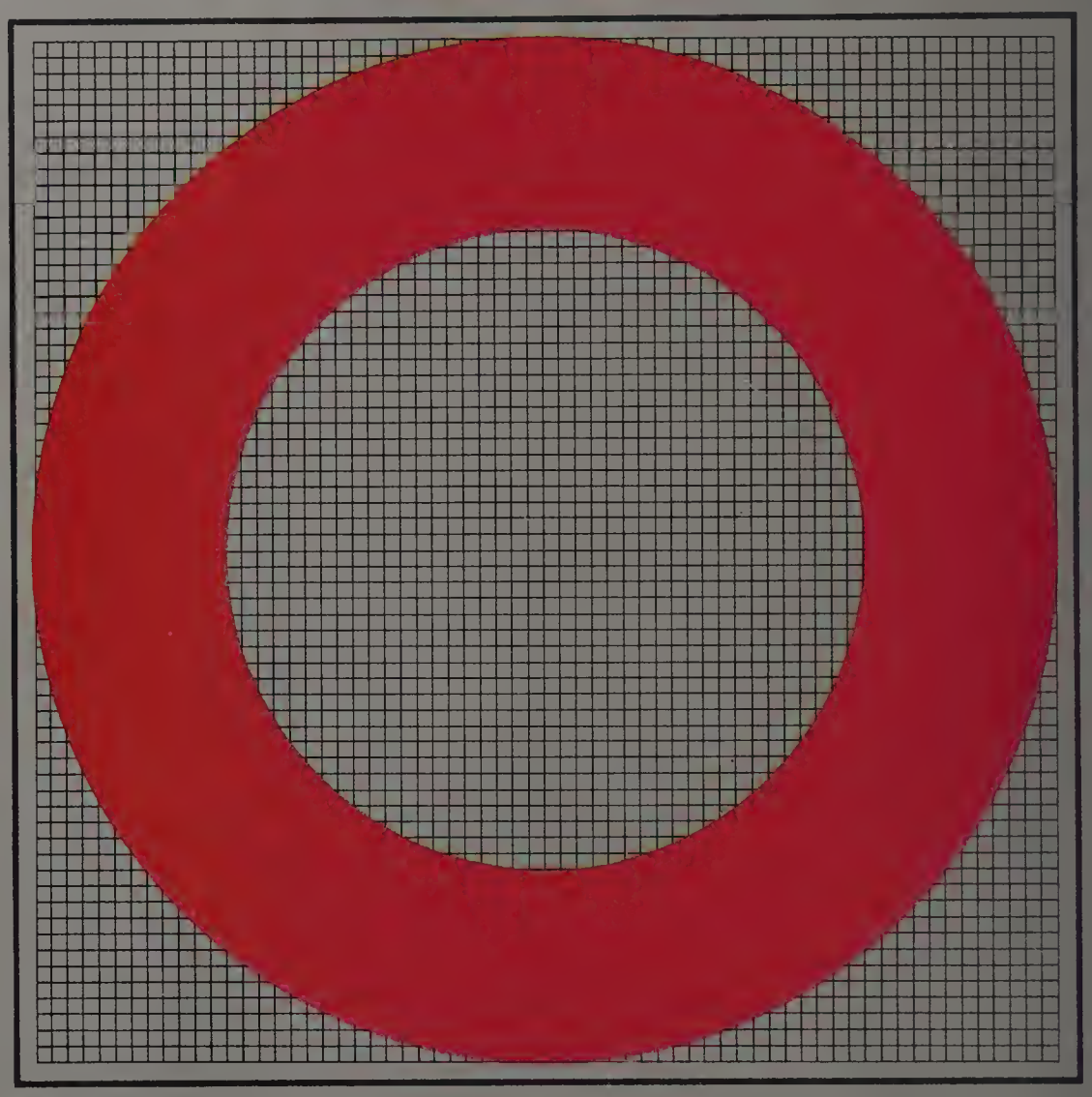
alpha SOFTWARE CORP.

12 New England Executive Park, Burlington, Massachusetts 01803

™ signifies manufacturer's trademark. ® signifies manufacturer's registered trademark. © 1983 Alpha Software Corp.

Reader Service #6

TESTED TWICE. GUARANTEED FOREVER.



Introducing Wordsworth™ flexible disks—the most reliable disks ever tested.

Twice.

First, every single Wordsworth disk gets hit with a barrage of rigid quality-control tests to make sure we meet or beat every technical spec demanded by the people at ANSI and ECMA.

But, since very few things in this world are perfect (including tests), we test every single disk again, for exactly the same criteria. And only if a disk is second-time certified 100% error-free is it pronounced worthy of the name Wordsworth.

Which is about as synonymous as possible with "perfect."

Which, in turn, means you'll have an easy time answering questions like: Is every inch of every track certifiably 100% error-free? Will it play back exactly what you fed in, without missing a single bit? Every time? From now until death and taxes are eliminated?

And then we have a very simple rule: If the disk doesn't check out, it gets chucked out.

Why do we go to all this bother?

Because, very simply, Wordsworth is the world's newest major brand, created and tested with the world's newest and best technology. It's a premium product that will become the world's most widely used disk for absolutely critical information applications.

Our disks come in 5¼" and 8" sizes, in virtually every configuration, for compatibility with virtually every microcomputer on the market. Unlike any other disks in the industry, every one is tested twice; so, unlike anyone else in the industry, we can guarantee them not for 30 days or 90 days or even 5 years . . . but forever.

And forever, as you may have heard, is a long, long time.

WORDSWORTH™

LEADING EDGE®

Distributed exclusively by Leading Edge Products, Information Systems and Supplies Division, 55 Providence Highway, Norwood, MA 02062. Dealers: Call toll-free 1-800-343-8413; or in Massachusetts, call collect (617) 769-8150.

History will record as a profound irony
that the most powerful word processing package
ever created for the IBM® Personal Computer
wasn't created by IBM.

LEADING EDGE.®

Leading Edge Products Inc., Fortune 1300 Division, 21 Highland Circle, Needham Heights, Mass. 02194 (800) 343-3436 (617) 449-67[illegible]
Headquarters and Retail Division, 225 Turnpike Street, Canton, Mass. 02021 (800) 343-6833 (617) 828-8150

Reader Service #91

*IBM is a registered trademark of International Business Machines Corporation

You're looking at the only word processor that's as easy to use as SuperWriter.™

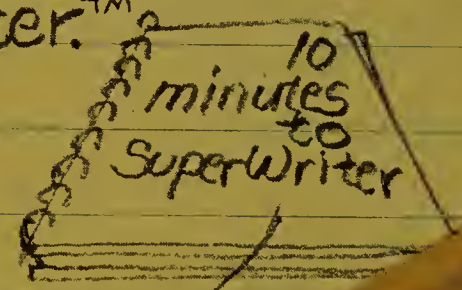
If you're like most people, you don't want to make a career out of word processing. When you have to write a simple letter or memo, all you want to do is roll up your sleeves and get down to business.

And if you're buying a personal computer, now there's a new software package that makes things just that simple.

SuperWriter.™

Write your first letter in 10 minutes flat.

With some word processing software, you have to learn dozens of different commands. But with SuperWriter, you only have to remember three keys. And we give you a self-paced starter guide that shows you exactly what to do, step by step.



So it doesn't matter if you've never used a computer before. Or if you're only a hunt-and-peck typist. With the SuperWriter word processing program, you can write a perfect business letter the very first time.

It's that simple.

Everything you need for only **$295.00**—even a spelling checker.

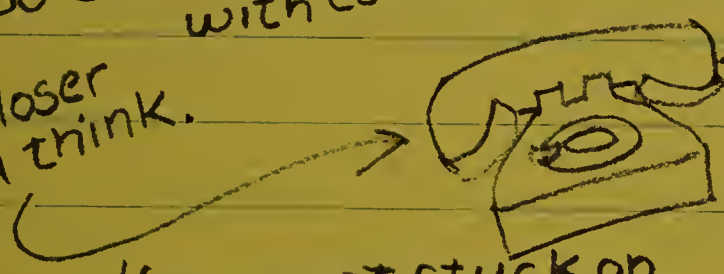
We're talking about a really complete package here. You get a full-function word processor, our 20,000-word SuperSpellGuard™ spelling checker, and a form letter generator. All for $295.00 suggested retail. To get all these functions any other way, you might have to spend $900.00 or more.

You never knew your letters could look so good.

We've built all kinds of professional features into SuperWriter. Like proportional spacing. Boldface highlighting. Memo formatting. And more.

So even if you're a complete beginner, you'll wind up with completely professional results.

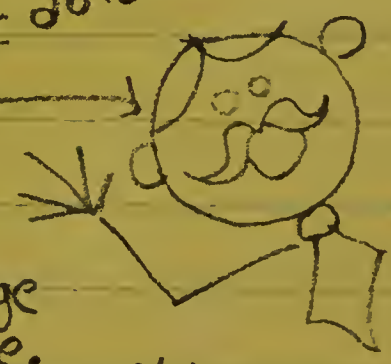
Help is closer than you think.



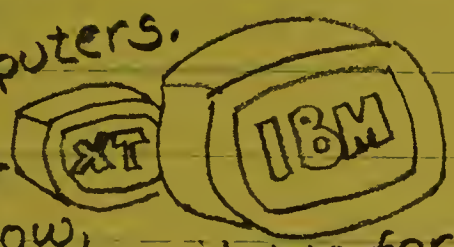
If you get stuck on a problem with any other word processing software, you'll probably have to go back to the store for help.

But if you have any questions at all about SuperWriter, all you do is pick up the phone. We've got a full-time crew of customer service experts on call, ready to help you out.

About the only thing it can't do is doodle.



Works on lots of personal computers.



Right now, SuperWriter is available for the IBM PC and the new IBM PC XT. Of course, it takes full advantage of their features—full color, hard disk and more.

By June 15, we'll have SuperWriter ready for CP/M, CP/M-86 and MS/DOS operating systems, which means you can use it on most of the popular personal computers.

So stop by your nearest computer or software store soon and ask about SuperWriter. In just 10 minutes, you can learn everything you ever need to know about word processing. And see why every other system is too complicated for words.

SuperWriter™
SORCIM®

2310 Lundy Ave.
San Jose, CA 95131
(408) 942-1727

CP/M is a registered trademark of Digital Research CP/M-86 is a trademark of Digital Research MS DOS is a registered trademark of Microsoft Corporation IBM is a registered trademark of International Business Machines Corporation c 1983 Sorcim Corporation

David Bunnell
President & Publisher

Andrew Fluegelman
Editor-in-Chief

Jacqueline Poitier
Associate Publisher

Cheryl Woodard
Associate Publisher

Editorial
Editor: Harry Miller
Editor, Special Editions: Kearney Rietmann
Associate Editors: Hartley Lesser, Robert Luhn
Product Review Editor: Christine Whyte
Assistant Editor: Lisa B. Stahr
Editorial Manager: Cindy Hamburger
Senior Copy Editor: Evelyn Spire
Copy Editors: Daniel Farber, Joe Matazzoni, Ted Nace
Editorial Assistants: Anna Bunker, Adrian Mello, Reed McManus, Katie Seger
Editorial Secretary: Bobbie Leach
Contributing Editors: Burton L. Alperson, Richard Cook, Eddie Currie, Danny Goodman, Larry Jordan, Karl Koessel, Lawrence J. Magid, Gene Plantz, Larry Press, Edward Rodgers, Stuart R. Schwartz, Andrew T. Williams

PC World Books
Editor: Jeremy Joan Hewes
Contributing Editor: Seth Novogrodsky
Editorial Assistant: Lindy Wankoff

Art & Production
Designer: Marjorie Spiegelman
Art Director: Mick Wiggins
Associate Art Director: Bruce Charonnat
Production Manager: Frances Mann
Editorial Production Manager: Ellyn Hament
Design Associates: Dennis McLeod, Monica Thorsnes
Artist: Molly Windsor-McLeod
Advertising Production Coordinator: Nan Cassady
Production Assistants: Clare Bouey, Rosetta Egan
Contributing Photographer: David Bishop

Telecommunications
Manager: Eric Brown
Specialist: Art Wilcox
Telecommunicators: Susan M. Ford, Mark L. Duran

Sales
Sales Director: Meredith Browning

Advertising Sales
Senior Account Manager: Noreen St. Pierre
Account Managers: Dick Barthelme, Linda Crawford, J. Mark Doss, Vince Ivey, Penny Rigby
Research: Rodney Brooks
Sales Associates: Rich Arzaga, Patricia Navone
Sales Coordinators: Niki Stranz, Loretta Giglione
Sales Assistants: Jan Dente, Kathleen Robinson, Carol Watson

Single Copy Sales
Manager: Bill Cox
Dealer Sales Manager: Christopher Van Dyke
Dealer Sales Account Managers: Ralph Ames, Pattie Lesser, Christopher Clarke
Sales Assistant: Beth Phelps

Circulation
Marketing Manager: Brooke Hazard
Marketing Assistant: Jayne Boyer
Subscription Services: Lorrie Poch
Subscription Promotions: Laurie Ferguson

Special Projects
Director: Susan R. Keller
Administrative Assistant: Janet McCandless

Communications
Assistant to the Publisher: Noreen Giannini-Browning
Administrative Assistant: Phyllis Stewart
Communications Assistant: Glenda A. Clarke

Technical Department
Manager: Steven Cook

Administration
Executive Vice-President: Jim Riding
Director of Administration: Janet D. McGinnis
Assistant Administrator: Sarah Cox
Financial Planner: Rick Thng
Accounting Manager: Pat Murphy
Assistant Accounting Manager: Michelle Reyes
Office Manager: Joseph Wollenweber
Administrative Assistant: Margriet Renske Kiers
Receptionist: Kathy Girard

PC World™ (ISSN 0737-8939) is published monthly for $24 one year, $39 for two years, $53 for three years by PC World Communications, Inc., 555 De Haro St., San Francisco, CA 94107. Additional postage outside the US and Canada $24 per year surface, $101 per year airmail. Second-class postage paid at San Francisco and at additional mail offices. POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 6700, Bergenfield, NJ 07621.

Editorial and Business Offices: 555 De Haro St., San Francisco, CA 94107, 415/861-3861

CompuServe 74055,412
The Source STE908

PC World™ is an independent journal, not affiliated in any way with International Business Machines Corporation. IBM is a registered trademark of International Business Machines Corp. Entire contents Copyright 1983, PC World Communications, Inc. All rights reserved. The following are trademarks of PC World Communications, Inc.: PC World View, *.*, PC World.

Printed in the United States of America.

Hang your hat on the SPRINT 11 PLUS™.

Call the distributor nearest you to get the best quality printer for your IBM PC.

U.S. PRINTER DISTRIBUTORS

American Calculator & Computer (205) 933-2344—AL
Anacomp (206) 881-1113—CA, UT, WA
Anthem Systems (415) 342-9182—CA
Bohlig & Associates (612) 922-7011—MN
Butler Associates (617) 964-5270—CT, MA
Byte Industries (800) 972-5948 (CA Only) (800) 227-2070 (Outside CA)
David Jamison Carlyle (800) 421-3522 (CA Only) (800) 352-3522 (Outside CA) CO, HI, IL, NJ, TX
Computers & Peripherals Int. (315) 476-6664—NY
Datamite (406) 727-4422—MT
The Datastore (609) 779-0200—NJ
Data Systems Marketing (619) 560-9222—AZ, CA, CO, MT, NM, PA, TX, UT, WA
Data Technology Industries (415) 638-1206—CA
Equipment Resources (404) 955-0313—GA
Gentry Associates (305) 859-7450—FL, GA, LA, NC, SC, TN
Horizon Technology (214) 680-9600—TX
Inland Associates (913) 764-7977—KS
InterACT Computer Systems (704) 254-1949—FL, GA, NC
Kierulff Electronics (800) 338-8811—AZ, CA, CO, CT, FL, GA, MA, MD, MN, MO, NC, NJ, OH, OK, TX, UT, WA, WI
MicroAmerica Distributing (800) 431-7660 (MA Only) (800) 343-4411 (Outside MA) CA, MA, TX
Midwest Microcomputers (419) 782-1115—OH
National Computer Syndicate (312) 459-6400—IL, MN
Pacific Mountain States (213) 989-6113—CA
PCA Microsystems, Inc. (512) 654-4711—TX
PCS, Inc. (214) 931-1276—TX
Pioneer Electronics (216) 587-3600—AL, CT, FL, GA, IL, IN, MA, MD, MI, MN, NC, NJ, NY, OH, PA, TX
R.C. Data (408) 946-3800—CA
Re:Action Office & Computer Svcs. (916) 972-9729—CA
Rudor Communications (212) 245-5509—NYC
Schweber (800) 645-3040 AL, CA, CT, FL, GA, IA, IL, MA, MD, MI, MN, NJ, NY, OH, OK, PA, TX, WI
Spectrum (800) 527-0790—TX
Tek-Aids Industries (312) 870-7400—IL, PA, TX
Terminal Rentals (714) 832-2414—CA
Terminals Unlimited (800) 336-0423 (24 Locations)
Tricom (516) 681-1222—NY
Unico (512) 451-0251—TX
Victor Electronics (617) 481-4010—CT, MA
Western New York Computer (716) 381-4120—NY

CANADIAN PRINTER DISTRIBUTORS

Abacus Data Services (416) 677-9555—Ontario
DataTech Systems (604) 479-7117 Alberta, BC, Ontario
Data Terminal Mart (416) 677-0184 Alberta, BC, Nova Scotia, Ontario, Quebec
Future Electronics (514) 697-7710 Alberta, BC, Ontario, Quebec
Micro Distributing (604) 464-5634—BC
Printerm Data (416) 977-1711—Ontario

Qume®
A Subsidiary of ITT

How to get top-quality printing for your IBM PC.

Without paying top dollar.



To get the most out of your IBM PC, you need a professional letter-quality printer. Not just somebody's converted typewriter. Why compromise your computer investment with a makeshift add-on? Especially when Qume's SPRINT 11 PLUS™—one of the world's best, most reliable printers—is so affordable. It plugs right into your PC, turns out letter-perfect print at 40 characters per second, and works beautifully with your IBM PC business software. Including sophisticated word processing packages. So don't be fooled by low-price, low-performance printers. And don't spend more than you need to. Choose the dependable, premium-quality SPRINT 11 PLUS from Qume. It's the best printer you can buy for your IBM-PC. And the best buy in printers.

For full details on the SPRINT 11 PLUS, contact one of the convenient Qume distributors listed. Qume Corporation, 2350 Qume Drive, San Jose, California 95131.

Qume®
A Subsidiary of ITT

PC WORLD

The Personal Computer Magazine for IBM PCs and Compatibles

State of the Art

38 Bits of Speech, ***Henry Polard***
An overview of speech technology and the latest speech products for the PC.

56 Plug In a Processor, ***Steven Cook***
Sritek's new line of modular plug-ins brings adaptability and high-performance processing to the PC.

68 Special Delivery Software, ***Lisa B. Stahr***
Teledistribution and the future of software marketing.

Notice to Readers
As a service to our readers, *PC World* features a Reader Service Inquiry card in each issue. This card can be used to get additional information about products advertised in *PC World*. To use the card, simply circle the Reader Service Number of the products you're interested in and mail in the card—no postage is necessary. The information you want will be mailed to you by the product manufacturers. For your convenience, Reader Service Numbers are listed in the Products and Advertisers Indexes, grouped according to type of product and manufacturer.

Review

100 Computer-Aided Design, ***Davis Straub***
The Drawing Processor, MicroCAD, *and* AutoCAD *bring automated drawing processing to the PC.*

120 Stretching VisiCalc, ***Edwin T. Moore***
StretchCalc *challenges* 1-2-3 *for spreadbase supremacy.*

138 Corona: For Here or to Go, ***David Keith***
Better features at a lower price—Corona's compatibles look good from every angle.

150 Easy Writing, ***Andrew T. Williams***
EasyWriter II *lives up to its name.*

166 Dedicated to Word Processing, ***Merrily Shinyeda***
Professional-quality word processing from NBI.

180 For Game Gourmets, ***Richard Cook***
Zork III, Starcross, *and* Snipes.

Photo/illustration credits: David Bishop, cover (gear courtesy of Nelson Johnson/MicroCAD), 56, 100, 120, 150, 166, 198, 224, 240; Brad Holland, 282; Ed Kashi, 15; Jerry McDonald, 68; Nick Pavloff, 296; Ward Schumaker, 83; Fred Stimson, 294.

October 1983

Hands On

198 We Interrupt This Program, *Stuart Greenberg*
Merging assembly language subroutines into BASIC programs.

224 A Tandy New Peripheral, *Richard A. Brown*
The Radio Shack TRS-80 Model 100, a good thing in a small package.

240 Smartmodem Gets Smarter, *Burton L. Alperson*
A free program for easy phone dialing.

Departments

11 David Bunnell
15 REMark, *Nelson Johnson*
19 Harry Miller
24 Letters
83 PC World View, *Miriam Medom*
255 The Help Screen, *Karl Koessel*
266 *.*, *Edited by Andrew Fluegelman*
305 BBS Watch, *Gene Plantz*
313 User Group Dispatch, *James B. Cookinham*
333 World Events, *Edited by Patricia Navone*
360 Just Announced, *Edited by Anna Bunker*

Community

282 The Fifth Generation, *Mark Seligman*
A report on Japan's 10-year program to take control of the computer industry.

294 The First Portable PC, *Jonathan Littman*
The history of SCAMP, the PC's grandparent.

346 PC World Directory
A convenient guide to products and services.

Indexes

381 Products
384 Advertisers

How to test drive the IBM Personal Computer.



When you get behind the keyboard of the IBM Personal Computer, hold onto your hat.

It's responsive on short trips.

It's reliable on long hauls.

And it's passing a lot of the others already on the road.

What's under the hood?

Visit an authorized IBM Personal Computer dealer and test drive the system.

You'll be impressed that a compact with such a great sticker price is also such a powerful performer.

For starters, it's been engineered with *three* microprocessors for better overall responsiveness. A 16-bit microprocessor in the system unit makes the IBM Personal Computer right at home in the fast lane. Another controls the monitor. And there's yet a third in the keyboard. (Put the keyboard on your lap—it's a perfect example of independent suspension.)

There are 10 function keys that help relieve the tedium of repetitious shifting. (Something like driving an automatic instead of a standard.)

And there are high resolution graphics that could come in first—were there a Grand Prix of personal computers. Get a demonstration of the text and graphics mix. And be sure to see it all in living color. (For more specifics, check out the box at right.)

Easy acceleration.

Whether you plan on using the IBM Personal Computer to manage a department, run a business, teach a course, learn a lesson or simply go on a pleasure drive—there's software to head you in the right direction and to help you stay ahead.

While you're at the store, try a few programs—first hand. Even if you've had no computer experience, you can quickly get into gear.

The driver's manual IBM wrote for you will help simplify matters. And the hardware's been designed to do the same.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory
64K-640K bytes

Microprocessor
16-bit, 8088

Auxiliary Memory
2 optional internal diskette drives, 5¼" 160KB/180KB or 320KB/360KB per diskette

Keyboard
83 keys, 6 ft. cord attaches to system unit
10 function keys
10-key numeric pad

Diagnostics
Power-on self testing
Parity checking

Display Screens
Color or monochrome
High-resolution
80 characters x 25 lines
Upper and lower case

Operating Systems
DOS, UCSD p-System, CP/M-86†

Languages
BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL

Printer
All-points-addressable graphics capability
Bidirectional
80 characters/second
18 character styles
9 x 9 character matrix

Permanent Memory
(ROM) 40K bytes

Color/Graphics
Text mode:
16 colors
256 characters and symbols in ROM
Graphics mode:
4-color resolution: 320h x 200v
Black & white resolution: 640h x 200v
Simultaneous graphics & text capability

Communications
RS-232-C interface
SDLC, Asynchronous, Bisynchronous protocols
Up to 9600 bits per second

They won't steer you wrong.

The trained salespeople at your authorized IBM Personal Computer dealer realize that you may never have been in this particular driver's seat before.

They want you to relax. They want you to ask any question you want to ask. They're ready and willing to provide you with all the answers—and to help pick the system and the software right for you.

For more information on where to buy the IBM Personal Computer, call 800-447-4700. In Alaska or Hawaii, call 800-447-0890.

You'll see why the IBM Personal Computer doesn't take a back seat to any other system.

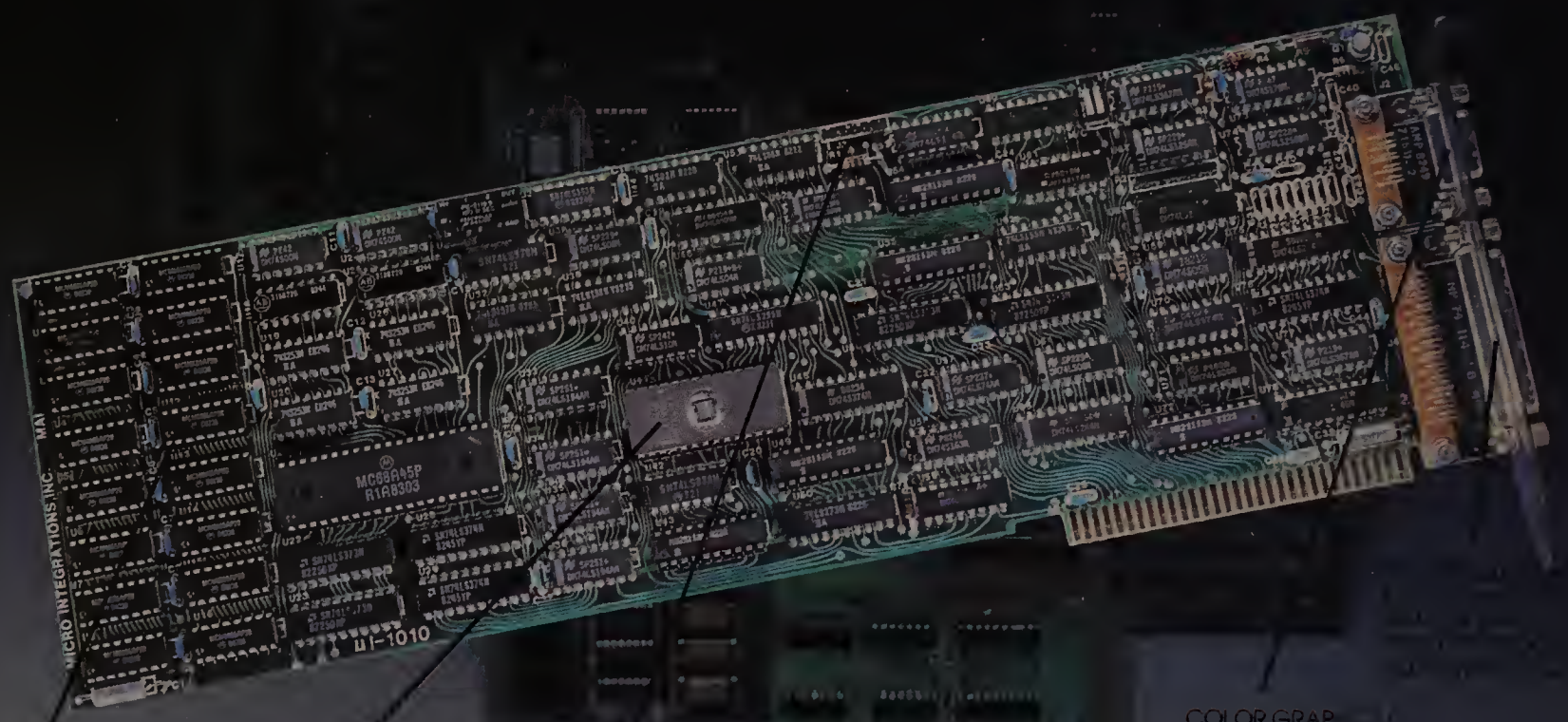
IBM®

The IBM Personal Computer
A tool for modern times

†UCSD p-System is a trademark of the Regents of the University of California. CP/M-86 is a trademark of Digital Research, Inc.

Reader Service #79

Put graphics & multi function in one slot.



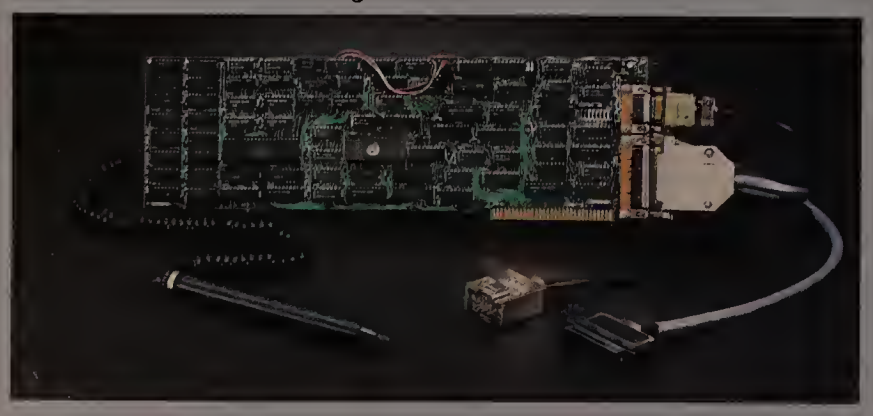
MEMORY EXPANSION - 128K Bytes of DRAM can be allocated for up to 96K of user RAM

ERASABLE UV PROM - Allows easy modification of character set for special applications or languages

HIGH RESOLUTION LIGHT PEN CIRCUITRY

COLOR GRAP
MONOCH
Color-II com
v deo - 640 x 400
tion. Video-310A
IBM Monochrome
compatible - 8 pages of text storage

This IBM/PC compatible board provides memory expansion (128 KBytes of DRAM), monochrome or co
pen, and printer
board's high-density memory (up to 8 pictures storage) provides unexcelled color graphics enhanced up to 640(H) x 400(V) resolution in a wide variety of operating modes. Modes are selectable right on the board.



Now available with Halo* software for 320 x 200 16-color, 640 x 200 4-color, and 400 vertical line resolution modes. (*Halo is a registered trademark of Media Cybernetics, Inc.)

COMPARISON CHART

	COLOR		MONOCHROME	
	IBM	AMDEK	IBM	AMDEK
SLOT 1	Color Graphics Board	MAI Board	Black & White/ Parallel Board	MAI Board
SLOT 2	Printer Board			
SLOT 3	RAM Board 1 Slot Left*	3 Slots Left*	RAM Board 2 Slots Left*	3 Slots Left*

*When Using Disk Controller

Just circle the reader service number, or call direct for complete technical specifications and prices.

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786

AMDEK

REGIONAL OFFICES: Calif. (714) 662-3949 • Texas (817) 498-2334

Amdek . . . your guide to innovative computing!

Reader Service #204

David Bunnell

PC Lingo

Many people are so intellectually tantalized by their PCs that they are rapidly merging PC jargon into their everyday conversation. Take the symbol *k*, for example. Depending on who you are talking to and under what circumstances, it means either 1000 or 1024. In computer terminology, memory is often measured in kilobytes (K) or in megabytes (M). It is not uncommon to hear people speak of other commodities such as money (an $80K salary, for example, is megabucks) using these computer memory designations.

Concurrent (more lingo!) with the transformation of PC jargon to everyday speech is the reverse process, by which everyday words and phrases become computer jargon. Two current examples are *compatibility* and *integration*.

During the heyday of encounter groups and *Psychology Today* in the '60s, *compatibility* was one of the most common buzzwords of a prevalent pastime—pop psychology. In the '80s compatibility is a computer buzzword that means that two computers can use the same software, or nearly use it. The word is no more precise as a computer term than it was in its pop psychology days.

In the computer community, the word *integration* no longer conjures up images of civil rights struggles; instead, it means two or more applications wrapped up in one program.



Does our involvement with PCs and the changes in language that mirror this reality make us less concerned with social issues? Or is it in fact the opposite? I am convinced that learning about computers helps us understand our own thinking and communications processes. In this sense PC awareness has a definite humanizing potential.

Think about the term *co-processors*. Some computers have, in effect, two brains. One brain can be dedicated to one set of tasks while the other is dedicated to the remaining tasks, or the two can share the same functions and thereby speed up computation time.

Some people believe that the human brain also has co-processors, a right brain and a left brain. Common wisdom has it that the right brain performs artistic and conceptual thinking, while the left brain handles logic and common sense. But suppose that, like computers, we could choose to teach (program) our right and left brains to act as co-processors that could handle the same or different types of tasks at one time. This would allow us, for example, to follow two lines of thought at once or read a book while carrying on a conversation. After learning to use our co-processors, we could move on to multiprocessing.

No one can know for sure if the ultimate impact of computers on our society will be good, bad, or indifferent—or if they will have any ultimate impact at all. While PCs are becoming tremendous information tools that can unleash human potential on a new scale, other computers are being used to create nuclear weapons systems. The outcome, of course, will be determined by how we decide to use computers.

So meanwhile, compatible people, keep on processing that input and transmitting those kilobytes, and don't forget to back up your data.

In the Hard Disk Jungle Tallgrass Clears a Path



In today's hard disk jungle, Tallgrass clears a path by offering high performance, integrated mass storage solutions for the IBM® PC and compatibles, the T.I. Professional and the Victor 9000 computers.

TALLGRASS INNOVATIVE FEATURES

MASS STORAGE SYSTEMS with formatted HardFile™ capacities of 6, 12, 20, 35 and 70 Mb, all with built-in tape backup.

CONVENIENT INTEGRAL TAPE BACKUP SYSTEM allows rapid tape "image" streaming, or incremental file-by-file backup and restore on ANSI standard inexpensive data cartridges, instead of the usual floppies, video cassettes, or low-capacity removable Winchester devices.

NETWORK READY and fully compatible with networks such as PCnet® and EtherShare.™

HIGH RELIABILITY with dual directory and read-after-write verify options. A dedicated landing zone, where the read/write heads reside when the disk is idle, provides data protection during powerdowns and transportation.

EtherShare™ is a registered trademark of 3Com Corp.
PCnet® is a trademark of Orchid Technology
IBM® is a registered trademark of International Business Machines Corp.

Reader Service #188

Follow the Tallgrass path to your local computer dealer and watch your personal computer transform into a powerful data processing system. From $2,995.00 U.S. including integral tape backup.

Available from COMPUTERLAND,® Entré® Computer Centers, MicroAge® Computer Stores and other participating computer dealers.

New!
IBM-XT Cartridge Tape Backup

World Headquarters: Tallgrass Technologies Corp. / 11667 W. 90th St. Overland Park, KS 66214 / 913-492-6002 / Telex: 215406 TBYT UR

Canadian Distributors: Micro-Ware / 440 Phillip St. Waterloo, Ontario N2L 5R9 / 519-884-4541
CompuServe / 1675 W. 8th St. / Vancouver, B.C. V6J 1V2 / 604-733-7783

European Distributor: CPS Computer Group, LTD Birmingham, England B276BH / (021) 7073866

Australian Headquarters: Tallgrass Technologies (Australia) / Five Dock Plaza, Suite 12 / 50 Great North Road / Five Dock / Sydney, N.S.W. 2046 / (02) 712-2010

Tallgrass Technologies Corporation

Expand your possibilities with Concurrent CP/M.™

If you have to wait impatiently for your personal computer to finish a job before moving on to another task, you need Concurrent CP/M. This new software technology from Digital Research increases the productivity of your IBM PC by allowing you to do more with it.

Using Concurrent CP/M, you can run several programs simultaneously, switching instantly from one program to another. For the first time you can write a letter while you do your financial planning. For the first time you can write text while printing other documents. For the first time you can edit programs while your program compiles. Concurrent CP/M is the best investment you can make in microcomputing because it multiplies the value of your hardware and lets you use all the CP/M compatible programs. And if you're developing software, it ensures that you're on the crest of the hottest new wave in the business.

So quadruple the effectiveness of your IBM Personal Computer with Concurrent CP/M. Now available through the CP/M Library.™ See your local microcomputer dealer or contact Digital Research, 160 Central Avenue, Pacific Grove, CA 93950 (408) 649-3896.

Now your IBM® PC can do more than one thing at a time.



The logo, tagline and names of DRI products are either trademarks or registered trademarks of Digital Research Inc.
IBM is a registered trademark of International Business Machines, Corp.
© Copyright 1982 by Digital Research Inc.

DIGITAL RESEARCH™
The creators of CP/M™

Reader Service #62

THE NEW STANDARD. THE MICROSOFT MOUSE.



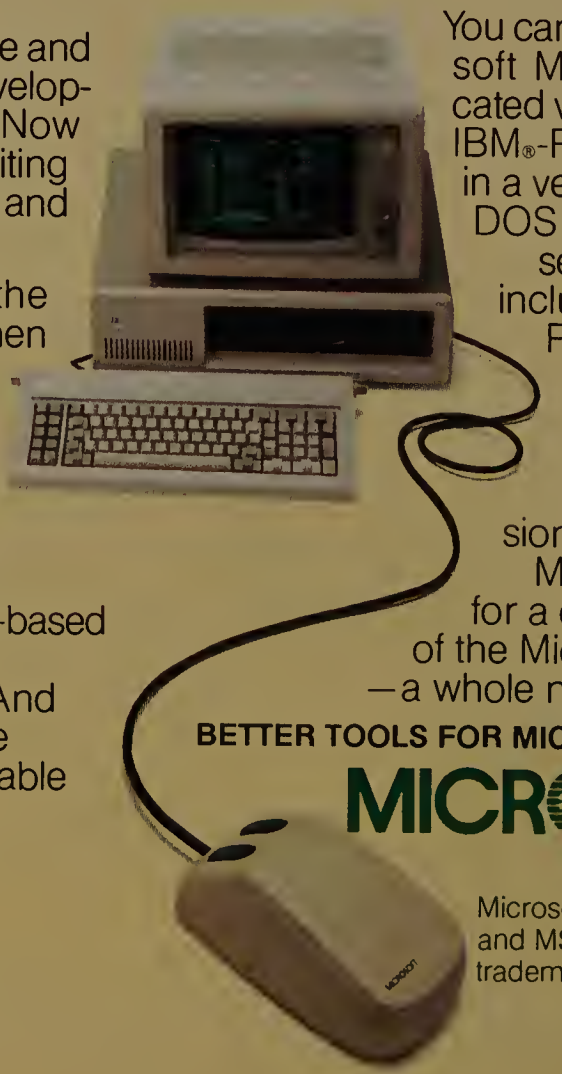
Microsoft, the people who set the standard for software, have done it again with the Microsoft® Mouse.

Our expertise in both hardware and software has gone into the development of the Microsoft Mouse. Now you can plug in the most exciting computer product of the year and put it to work.

The Mouse lets you move the cursor freely and naturally, then execute commands at the push of a button.

The Microsoft Mouse is a complete system. It comes with an on-screen tutorial, a practice application, and the Multi-Tool™ Notepad, a mouse-based text editor, so you can begin using the Mouse right away. And for application developers, the Mouse includes a programmable interface driver to give your application program complete control over the Mouse's operation.

That's the kind of support you'd expect from Microsoft. After all, we were the world's first microcomputer software company. Today, more than a million microcomputers are running Microsoft languages, operating systems, application programs, and hardware-software combinations.



You can get the Microsoft Mouse in dedicated versions for the IBM®-PC, PC XT, and in a version for MS™-DOS machines with serial interfaces, including the IBM-PC. The Mouse supports all versions of MS-DOS, including version 2.0. Ask your Microsoft dealer for a demonstration of the Microsoft Mouse —a whole new standard.

BETTER TOOLS FOR MICROCOMPUTERS

MICROSOFT™

Microsoft is a registered trademark, and MS and the Microsoft logo are trademarks of Microsoft Corporation.

REMark: Nelson Johnson

Software by Subscription

In the days before the personal computer we used to hire people on occasion to come into our offices and perform services such as typing, drawing, filing, and sorting. These services kept a number of clerical workers busy. Now, without thinking that the computer is performing a service for us, we purchase computer programs that assist us in these activities.

The programs that perform these tasks are not without flaws. Software developers are always looking for ways to refine their products—adapting to advances in computer technology and trying to stay ahead of the competition. Unfortunately, software manufacturers do not emphasize the evolutionary nature of computer software in their marketing strategies.

Until now software sellers have had a field day because consumers are easily impressed by a full-color, glossy package. Like an expensive box of candy, the typical software package is sold in the finest wrapping and promoted as an object to be desired and consumed, with little or no maintenance required. But consumers seek out software not to use and then discard; rather, they are looking for solutions to ongoing needs. Manufacturers try to make us forget this fact so that we will put up with a product's defects and limitations.



The software industry should focus more on providing adequate service to users than on sophisticated advertising and packaging. The nature of service is to be sensitive to the client, the recipient of the service. Publishers should provide every software product as an ongoing service to users. Developers need to bring products to a functional state of completion before putting them on the market. Products that have potential defects or have not been fully tested should be labeled as such.

After a product's introduction, the software publisher should cultivate a continuing service relationship with its customers. One of the best examples of such a relationship can be found in the pages you are now reading. With a magazine you receive the benefits of the subscription process. When you subscribe, you don't expect every issue to be the same. You expect change, novelty, and current information.

If only we could enjoy the same benefits when we subscribe to the services of the software publisher. Instead, we get one copy of the program. Maybe it allows us to make a backup copy. If the software is copy protected, we feel the need to wear surgical gloves when we use it, for fear the program will disappear in our hands.

Why can't software publishers offer periodic updates or editions? Surely providing updates creates overhead, but overhead can be minimized if users are required to show proof of purchase and pay a nominal fee for the update. Purchasers expect that the price they pay for a software package includes the good will of the publisher. Why not make that good will explicit?

Many people buy software only to find that the program crashes, destroys data, and sometimes even erases itself. These purchasers are

often told by the publishers to buy the program again or are put on hold when they telephone. Eventually they may decide not to bother complaining. The next year the same program may be sold without the bugs, which means that everyone but the customer who had early faith in the product gets to use a trouble-free package.

No customer should ever be made to feel that others have been treated more generously. Software publishers worry that their work will be illegally copied, yet they create a sense of betrayal in customers by not keeping them up-to-date. A dissatisfied customer may be tempted to copy a friend's new version of the program, a practice that software publishers concerned with copy protection do not want to encourage.

Software publishers create a sense of betrayal in customers by not keeping them up-to-date.

The word *customer* used to mean the same thing as *consumer,* except that *customer* implied that it was the consumer's "custom" to buy regularly from a certain vendor. Clearly, this customary relationship continued because the vendor made it worthwhile for the customer to return.

One way to establish a customary relationship between software publishers and customers is to structure software vending so that it uses the subscription process. Such a method would ensure that people be able to get a copy of the most current version of a program for a nominal fee. To get updates they would return the disk with the original label on it to the publisher. As long as the disk arrived accompanied by a prepaid, self-addressed mailer, the publisher could copy the latest version of the program onto it, put it in the mailer, and drop it in the mailbox. Documentation could be made available to customers for a fee with proof of purchase. The overhead to implement this method wouldn't have to be great and could be factored into the publisher's business plan.

The personal computer software industry has not yet recognized software development as a complex, evolving process that requires close interaction between users and programmers. Products that evolve gradually are usually durable because their complexity results from a carefully woven series of decisions based on user experiences and technological progress. Such a process is never really finished.

I expect that in a short time we will see less of the software publisher who puts a product on the market, pockets the money, and tells the customer to take a hike. As the industry matures, we will see more of the kind of publisher who provides a way for customers to benefit from the most updated version of a software investment. Over the long haul, satisfied customers are a better advertisement than fancy packaging.

Nelson Johnson is the author of a three-dimensional computer-aided design program called MicroCAD. *His special interest is combining architectural and civil engineering with personal computer technology.*

To find out where we're showing off the P1350 printer, call one of these Toshiba distributors:

DIGITAL ENTRY SYSTEMS
27 Spruce Street
Waltham, MA 02154
(617) 899-6111

GENERAL BUSINESS COMPUTERS, INC.
2 North Olney Avenue
Cherry Hill, NJ 08003
(609) 424-6500

INTECH GROUP
Royal Commerce Center
2025 Royal Lane
Dallas, TX 75229
(214) 241-1717

KALTRONICS DISTRIBUTORS, INC.
702 Landwehr Rd.
Northbrook, IL 60062
(312) 291-1220

MICROAMERICA DISTRIBUTING CO.
1377 Main Street
Waltham, MA 02154
(617) 647-9340

MICRO DISTRIBUTORS
11794 Parklawn Drive
Rockville, MD 20852
(301) 468-6450 or
(800) 638-6621

MICROWARE DISTRIBUTORS, INC.
20415 S.W. Blanton Avenue
Aloha, OR 97007
(503) 642-7679

MONROE DISTRIBUTING CO.
2999 Payne Avenue
Cleveland, OH 44114
(216) 781-4600

PARAGON SALES, INC
780 Charcot Avenue
San Jose, CA 95131
(408) 263-7955

PREMIER SOURCE DISTRIBUTING
1882 McGaw Avenue
Irvine, CA 92714
(714) 261-2011

STAR DATA, INC.
4021 N. 30th Street,
Suite 4
Phoenix, AZ 85016
(602) 955-9233

SYSPRINT, INC.
7777 S. Central Expressway
Suite 2A
Richardson, TX 75080
(214) 669-3666

TRANSALASKA DATA SYSTEMS, INC.
200 Center Court
Anchorage, AK 99502
(907) 561-1776

In Touch with Tomorrow
TOSHIBA

Reader Service #285

Nothing shows off your IBM PC™ like Toshiba's P1350 printer.



Now there's one three-way printer that fully equals the word processing, data and graphics capacity of your IBM PC: Toshiba's P1350.

But the P1350 is more than compatible with PC hardware. It will print programs like Lotus 1-2-3 data processing and graphics output with remarkable character definition.*

For even more flexibility, the Toshiba P1350 with Qume SPRINT 5 emulation handles all popular word processing programs. Under software command, the P1350 will print high-speed drafts or switch to letter-quality text and graphics.

The innovation behind this three-in-one flexibility is Toshiba's print head. Pin diameter has been reduced to just eight mils. And the number of pins in the print head has been increased to 24.

The result is a superior 360 by 180 dot-per-inch density pattern in the text mode. Instead of spinning your wheels at 40 cps, the P1350 produces letter-quality printing at 100 cps. In its draft mode, Toshiba's P1350 can accelerate up to 192 cps.

When it comes to graphics, the P1350 really shows its stuff. Whatever your computer displays, Toshiba's P1350 prints. With astonishingly clear definition. And extra-fine reproduction that can only come from a print head capable of 200 million impressions and exclusive 180 by 180 dot-per-inch graphics density pattern.

Then, if that's not enough to pique your interest, the P1350 also features three different fonts. Variable pitch. Subscripts, superscripts and underlining without the need of a second pass. A super-reliable optional sheet feeder. And more.

So show off your IBM. Or any other personal computer. With the superior quality and flexibility of Toshiba's spectacular P1350 printer.

Distributors on the adjacent list make it easy to find the P1350. Or get more information by calling toll-free, **1-800-457-7777.**

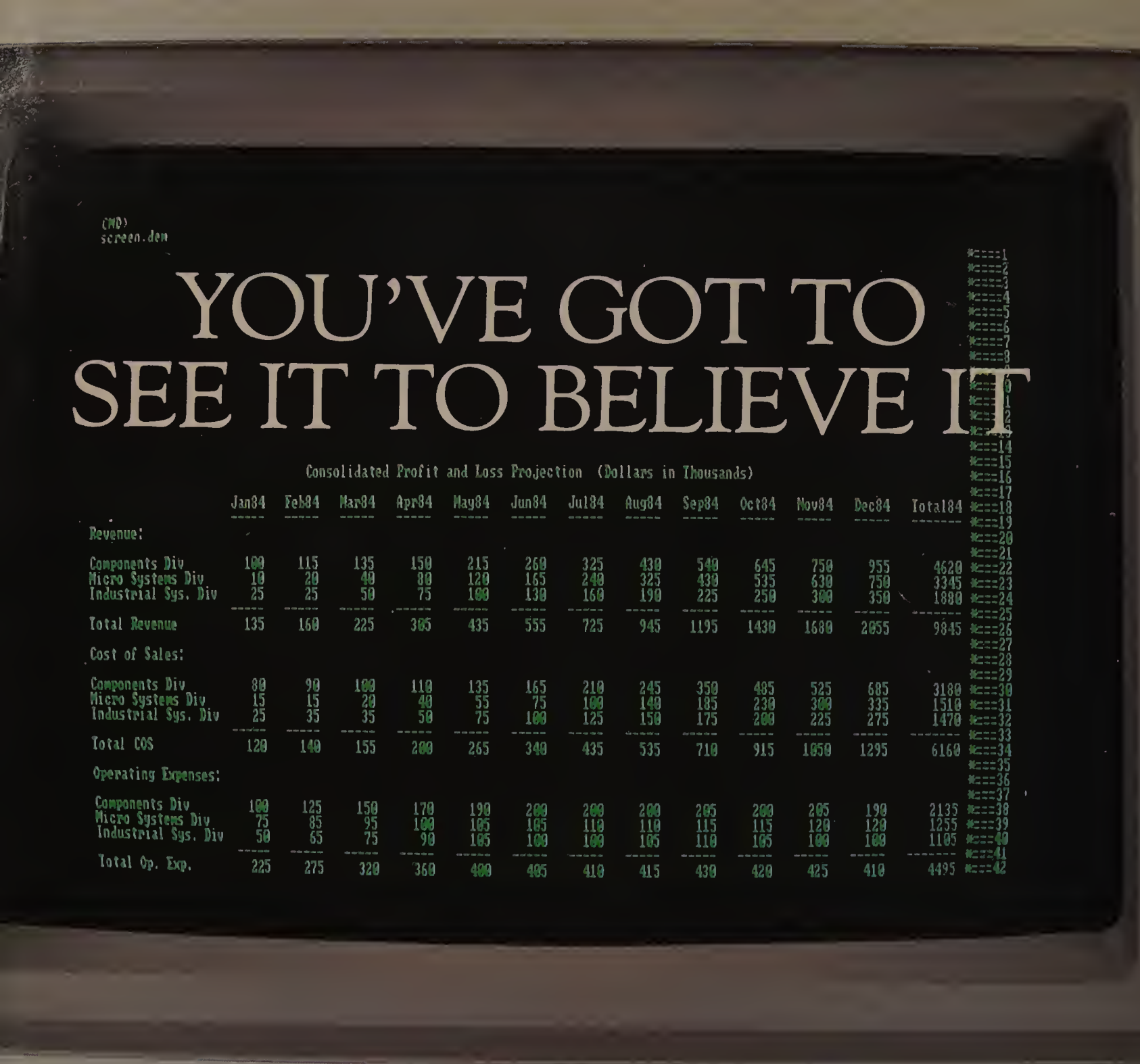
*IBM PC to P1350 graphics utilizes PaperScreen and color/graphics adapter. IBM PC is a Trademark of International Business Machines. Lotus and 1-2-3 are Trademarks of Lotus Development Corporation. ©1983 Toshiba America, Inc.

In Touch with Tomorrow

TOSHIBA

For further information, contact: Information Systems Division, **TOSHIBA AMERICA, INC.**, 2441 Michelle Drive, Tustin, CA 92680. Telex 183-812.

Reader Service #285



Introducing IBM PC-Compatible Hardware To Run Spreadsheet Software

It should be a simple thing, really, to see a full 132 column spreadsheet on your IBM PC. You shouldn't have to scroll up, down and sideways to get the full picture. Now you can see it all with **SuperVision,** a monochrome video interface board from **California Computer Systems.** It easily replaces your IBM PC monochrome board. In addition, SuperVision offers a full 132 column by 44 row screen, a printer port, and 720 by 348 dot addressable graphics capability.

SuperVision supplies the features that have been missing for spreadsheets, financial modeling, and database applications as well as giving you a fast, full-screen editor to make life easier. **Z/Plus,** a fast Z80B based card with CP/M and a full 192K of parity RAM is also available for your IBM PC.

Call CCS today and get the **FULL** picture.

(408) 734-5811

California Computer Systems
250 Caribbean Dr., Sunnyvale, CA 94086
(408)734-5811 Telex: 171959 CCS SUVL

SuperVision and Z/Plus are trademarks of CCS, Inc. IBM is a registered trademark of International Business Machines. CP/M is a trademark of Digital Equipment Inc. Z80B is a trademark of Zilog, Inc

Reader Service #305

Harry Miller

With Eyes Wide Open

In our premier issue Andrew Fluegelman, then editor, initiated our *REMark* column with a description of the journey to a new world of personal computing and an invitation to you, our readers, to join us in the exploration of that new world. Half a dozen issues later, as the new editor, I'd like to offer a reassessment of our vision—our course—and your participation in this adventure.

Since we started, our eyes have been held wide open. There seems to be no end to the innovations in this fast-moving marketplace. Every month we discover and report on new and more sophisticated products as well as on research and development activities that make Jules Verne look shortsighted. Our perennial fascination may be our greatest asset; it is certainly our guiding light.

You'd think we'd get jaded amid this shower of innovation and excitement. To be honest, it does take a bit more to perk our ears these days, but there always seems to be a bit more excitement with each new product announcement.

It's clear to all of us that the IBM PC is setting a new standard in computing. People who use the PC and compatibles have learned to expect more of their machines from the minute they turn them on. The hardware has to look sleeker and run more reliably. The software has to be easier to use and must automate many of



the tasks that 8-bit (and even mainframe) computers left to the user. As PC users assimilate the computer into their professional lives, they establish and perpetuate these standards of computer accessibility and productivity—standards that must be met or exceeded by any hardware or software vendor who wants to succeed. Thus, as the PC community (our readers) demands higher quality and greater usefulness from the industry, the vendors respond with the creativity and innovation that keep us fascinated.

It's easy for us to maintain our "reader-friendly" perspective. In our day-to-day work and in most of our spare time, we're PC users like any others. We are writers who use word processors, planners who use spreadsheets, and managers who use data base software. When deadlines approach, we're thankful for the ability to telecommunicate, and after 5 o'clock we're likely to be found relaxing with a new computer game.

Let's look at some of the things that have kept our interest and excitement high over these last few months.

We've discussed the State of the Art in compatibility, multitasking, display technology, user interface design, and operating systems. This month we even get to see how PCs can exhibit performance similar to a VAX—the high end of the much more expensive minicomputers.

Included in the "Review" section has been everything from communications programs to clones, from keyboard enhancers to color graphics boards, and from integrated applications programs to computer games. This month we compare three computer-aided design programs that run on the PC. Yes, computer-aided design. When I said that the applications grow ever more sophisticated, I meant it.

And the future is just as bright for new products. Some of us were treated to a unique sight recently at NCC: a lighthearted joker in a

No one else is using this simple method to teach you Lotus 1-2-3.

You didn't learn to swim by reading about it. You took the plunge. With a little extra support at first, 'til you could stay afloat on your own.



ATI's training software teaches you Lotus 1-2-3 in the same way.

The ATI training disk instructs by simulating the actual software. You practice each command by interacting with the screen, which responds just as Lotus 1-2-3 would.

It's faster—and easier—than any other method. Once you've learned the skills with our helping hand you're ready to swim on your own. Without sinking.

The ATI Training Power package for Lotus 1-2-3, with disk and handbook, is available at your computer dealer. Along with our line of training programs, based on the same simulation method, for other popular software.

Or, use the order form below to send for the ATI programs of your choice.

And dive right in.



Please rush me ATI Training Power™ programs, at $75 each for this software:

Integrated Software
☐ Lotus 1-2-3

Database Management
☐ dBASE II-vol. 1 & 2
☐ EasyFiler

Word Processing
☐ WordStar-vol. 1 & 2
☐ EasyWriter II
☐ Perfect Writer
☐ Spellbinder
☐ Benchmark

Financial Planning
☐ Multiplan
☐ SuperCalc
☐ VisiCalc
☐ Perfect Calc
☐ EasyPlanner
☐ Microplan

Operating Systems
☐ PC DOS
☐ MS DOS
☐ CP/M

Programming
☐ BASIC
☐ APPLESOFT BASIC

Accounting
☐ BPI Gen. Acct.
☐ Peachtree General Ledger*
☐ Peachtree Accounts Receivable*
☐ Peachtree Accounts Payable*

*PC(MS) DOS formats only.

My computer uses:
☐ PC DOS
☐ MS DOS
☐ CP/M
☐ CP/M-86
☐ XENIX
☐ APPLE II CP/M
☐ APPLE IIe 80 col.

My computer brand is _____

Enclosed is $75 each plus $2.50 shipping. (CA add 6.5%)

Name _____ Phone (____) _____

Street _____ City _____ State _____ Zip _____

Mail order form to:
Software Training Company
A Division of ATI
3770 Highland Avenue, Suite 201G
Manhattan Beach, CA 90266

ATI Money Back Guarantee
If you're not completely satisfied with how fast you learn with ATI Interactive Training Power Programs, simply return within 3 days for full purchase refund.

For rush order call:
(213) 546-5579

VISA MasterCard

Dealers:
call for sales kit
(213) 546-4725

ATI Training Power™

The following names are trademarks of the following companies: ATI Training Power, of American Training International; CP/M, of Digital Research; PC-DOS, of IBM; WordStar, of Micropro; Benchmark, of Metasoft; EasyWriter, EasyFiler, and EasyPlanner, of Information Unlimited Software; MS-DOS, and Multiplan, of Microsoft; dBASE II, of Ashton-Tate; SuperCalc, of Sorcim; VisiCalc, of VisiCorp.; Microplan, of Chang Laboratories; Peach Calc, of Peachtree Software; ATI Training Power, Software Sampler, of American Training International; Spellbinder, of Lexisoft; Perfect Writer, and Perfect Calc, of Perfect Software; Lotus, of Lotus.
© 1983 American Training International.

Reader Service #7

Harry Miller

Snoopy-type aviator hat controlling Microsoft's *Flight Simulator*—itself a marvel of realism—solely by spoken commands fed through a gizmo that Key Tronic calls an "intelligent keyboard."

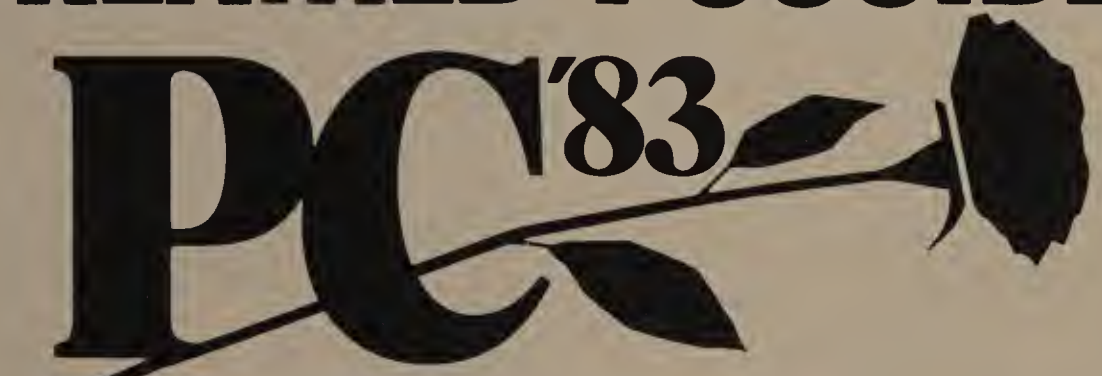
In our "Hands On" section we've brought you applications-oriented insights into the PC and its most advanced and popular software. We've published listings of some very useful and instructive programs and routines. These listings have been selected not only on the basis of their slickness or clever programming techniques, but also on their value as learning tools. The best way to learn a programming language is to use it and experiment with it. There is always an opportunity to improve on or add features to a program. We encourage you to seize that opportunity with some of the suggestions offered in the "Hands On" section. This month's "Hands On" articles include instructions for integrating assembly language subroutines into your BASIC programs and a handy program that dials the telephone automatically using your modem.

Topics in the "Community" section have run from pioneers to prophets, explored some issues in the retail marketplace, discussed how PCs are being used in a variety of work and leisure settings, and even brought the highlights of some special events to readers who couldn't be there. Described in this issue are an examination of Japan's efforts in the artificial intelligence race and a bit of the PC's lesser-known ancestry.

During the past six months, our vision and purpose have not changed; they have become clearer. We are sometimes explorers but always map makers. Where personal computing takes new leaps in technology, applications, and sheer excitement, that's where you'll find us—doing our best to document, analyze, and illustrate the developments.

Stay with us...and keep your eyes wide open.

YOUR IBM® PERSONAL COMPUTER IS ABOUT TO BECOME MORE POWERFUL THAN YOU EVER DREAMED POSSIBLE.



Boston's Bayside Exposition Center.
Morrissey Blvd. (Exit 17).
Southeast Expressway, South Boston.

TUES-THURS, OCT 4-6, 1983

(Note these are the new Show days. The event was once scheduled for Saturday-Monday, October 8-10.)

PC '83 is the largest gathering of PC-compatible products ever held on the East Coast. You'll find under one roof more than 500 exhibits of software for business, professional, home, personal and education applications; plug-in cards for memory expansion, telecommunications, speech and many other functions; hundreds of peripherals, including printers, networking systems and innovative new storage devices; plus dozens of publications, books and invaluable support services.

So if you do anything with the IBM Personal Computer or if you're considering buying one, be sure to put PC '83 in your calendar right away. Your PC will certainly appreciate it.

ADMISSION PRICES

One-day Exhibits ticket $10.
Three-Day Exhibits Ticket $25.

ADDITIONAL INFORMATION

To receive more information about attending or exhibiting at PC '83 call or write Northeast Expositions, Inc., 822 Boylston Street, Chestnut Hill, Mass. 02167. Tel: 800-841-7000 or 617-739-2000 (within Massachusetts).

IBM is a registered trademark of International Business Machines Corp.

Produced by Northeast Expositions, Inc., nationwide producers of the National Computer Shows, Applefest, CP/M '83, and Softcon.

PC '83/BOSTON TICKET ORDER FORM

☐ Enclosed is my payment for____ Three-Day Exhibits ticket(s) quantity at $25 each, which admits the attendee to the Show on Tuesday, Wednesday and Thursday.

☐ Enclosed is my payment for____ One-Day Exhibits Ticket(s) quantity at $10 each.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE____ ZIP_____

TELEPHONE ( ) _____ EXT.____

Mail to National Computer Shows/PC '83, 822 Boylston Street, Chestnut Hill, Mass. 02167. Checks only. No charge cards.

Reader Service #407

Thank god



Business at Bundtweiller Brass Beds is booming! And now that Friday!'s here to help out, I've got everything under control.

Friday!'s the revolutionary new micro-computer information management system from Ashton-Tate, the people who invented dBASE II.®

It came in Tuesday, and it took me almost no time at all to get the hang of it because Friday! works *with* me, not against me. I've already turned stacks and stacks of paper files into much more efficient "electronic files." And it's so easy to use that even Mr. Bundtweiller can do it.

So now, no matter what Mr. Bundtweiller needs to know—no matter when he needs it—he or I can find it in seconds.

The names and commissions earned by our top 25 salespeople since January 1st.

The total number of #3455 Brass Beds sold year-to-date, by region.

A quick report on our cash receivables.

Or the special report for the Board of Directors meeting this afternoon. Mr. Bundtweiller forgot to tell me about it until just before lunch, but Friday! and I got it done in no time at all. It looks gorgeous!

Friday! even knows how to keep private or confidential information to itself unless I ask for it using a special password.

Friday!'s helped me say goodbye to paper shuffling forever. It's terrific for inventory and invoices and paychecks and input screens and reports. It works with dBASE II® and 1-2-3[1] and WordStar[2] files. And the way it handles mailing lists and labels is just fantastic.

All for just $295. (suggested retail price). It's worth it for the mailing lists alone.

it's Friday!™



So if you need some good, reliable help to handle just about everything that needs handling around your office, for my money it's Friday! any day of the week.

For the name and location of the Friday! dealer nearest you, contact Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230.

Or better yet, just call (213) 204-5570 today and find out why so many people are saying: T.G.I.F.

ASHTON·TATE

© Ashton-Tate 1983.
Friday! runs under CP/M[3]-80, CP/M-86, PC-DOS[4] and MS-DOS.[5]
Friday! is a trademark and dBASE II is a registered trademark of Ashton-Tate
1-TM Lotus Corp. 2-TM Micropro. 3-Registered TM Digital Research.
4-TM IBM Corp. 5-TM Microsoft.

Reader Service #335

Letters

Small Is Beautiful

OK, enough is enough. Ever since *BYTE* magazine became so obese several years ago, it has been fashionable for computer magazines to look as if you'd need a forklift to maneuver them about. This "fatter is better" mentality would be fine if the quality of the contents matched the quantity of pages. In *PC World*'s first few issues, it looked as if this would be the case. However, I've just finished reading Volume 1, Number 5 and have reached the conclusion that it's about time to put the magazine on a diet.

I mean, it's enough to read David Bunnell's page, which, to be honest, reads like the same column month after month, but he is the Publisher and all, and anyway we can always skip that part. But then we're confronted with Martine Boot's *REMark* all about her kids and her garbage disposal. Do we really need this information to continue our PC education? Then there's the FORTRAN article ("Going to Bat with FORTRAN"), but some people still use FORTRAN, I guess, so that's all right. But then David Sudnow has to tell us all about his grand experiences with BASIC's SOUND command and the trauma he underwent debugging a simple FOR statement ("First Debugging"). For God's sake, don't tell him about BASIC's PLAY command or you'll have a dissertation on your hands. (He really needs to stick to piano playing.) After Sudnow comes a wordfind puzzle composed of BASIC's reserved words ("BASIC Boggler")...valuable information indeed.

Don't get me wrong, Number 5 was loaded with great information about hard disk backup, the FORTH language, communications packages, etc. I just think it was a little overloaded with articles that we, the readers, would have been just as happy without. Don't get yourself in the situation that the "other magazine" is in, where the thing is so large that it is actually uncomfortable to read at times. (What "other magazine," you ask? Hint: `THIS__MAG$ = "PCWORLD": OTHER__MAG$ = LEFT$(THIS__MAG$,2)`)

Some of the best and most informative computer magazines on the stands are also some of the thinnest (albeit, terribly unfashionable). Follow their lead: keep up the good work but get rid of the excess, and you'll have an excellent magazine on your hands.

Michael C. Mitchell
Sunnyvale, California

`ANSWER$ = "DISAGREE": FATTER = 0:BETTER = 1:IF FATTER <> BETTER THEN ANSWER$ = RIGHT$(ANSWER$,5)`— *Ed.*

The Missing Librarian

This note concerns the case of the missing librarian. It is a puzzling tale. The librarian should have been on its post. In fact, reputable parties are behaving as if there were a librarian. Unfortunately, there is no doubt that the librarian is missing! The question is, has the librarian failed to make an appearance because of someone's knavery? Or was it just stupidity?

The librarian I have sought in vain is not a person dispensing books. Rather it is a program without which it is very difficult to make full use of a compiler. It is a program that assembles compiled subroutines into a library that can be used by the linker to assemble the execution version of a program.

A word of explanation may be in order. An advantage of such languages as FORTRAN is that one can write real subroutines. These are quite different from the pseudo-subroutines available in BASIC. A real subroutine is one that can be written without much regard for the calling program. As long as the caller knows the exact calling sequence, there is no need to assure that variable names do not conflict with names in the main program or that statement numbers in the subroutine do not duplicate statement numbers in the main program.

These subroutines are usually written as independent packets of code that are compiled separately into object modules. Any good programmer soon assembles a large collection of such subroutines. When a new program is written, subroutine calls are inserted where needed. The new program is compiled into relocatable object code, but, of course, the program cannot be used until it has been linked by a Link program. The process requires that you specify all the OBJ modules of the subroutines into one well-ordered file, ready for submission to the Link program.

One would assume that such a librarian would be available for the IBM PC as part of PC-DOS. After all, IBM, Microsoft, Supersoft, and many others sell compilers. The cost of garden variety compilers is about $500. The vendors know all about libraries. In fact, they supply one or more libraries with their compilers,



Introducing BurgerTime™*
for your Apple and IBM. To beat this game, you've really got to move your buns.

Now you can make your Apple® II and IBM® Personal Computer sizzle. With fast-food action from BurgerTime™* by Mattel Electronics.

Build a better burger. Hold the mustard. And watch out for those pickles!

It's a tall order to fill. But you've got to do it before those hostile hot dogs cancel it.

BurgerTime™* from Mattel Electronics. A rare opportunity for computer game excitement.



Apple® II, II Plus, and IIe
Available this Fall.



IBM® Personal Computer

BurgerTime™ M NETWORK™ by MATTEL ELECTRONICS®

©MATTEL ELECTRONICS, INC. 1983 All Rights Reserved

*BurgerTime is a trademark of Data East USA, Inc., used under license. © 1982 Data East USA, Inc.
Apple II, II Plus, and IIe are trademarks of Apple Computer Inc. IBM is a trademark of International Business Machines Corp.

so they must have some means for preparing libraries. But for the user there is no publicly available librarian!

Why is the librarian missing? It is not because there is no need for one. The IBM PC-DOS manual (version 1.10) tells you in great detail (see pages 5-12 and 5-13) how to present libraries to the Link program. When I called my (usually helpful) dealer, he called IBM's hot line and was told that the answer is in the compiler manual. But this is simply not true. I have searched the manuals of all the compilers (BASIC, Pascal, and FORTRAN) currently available from IBM; there is absolutely no mention of a librarian. So much for the IBM hot line.

On further investigation I found that Microsoft has actually written a librarian. It is called MS-LIB, and it will accomplish the task. However, for some reason IBM has chosen not to include MS-LIB in PC-DOS. Furthermore, the only way one can purchase MS-LIB from Microsoft is by purchasing the C Compiler. The Microsoft hot line person was quite apologetic when she relayed this information. She admitted that it does not make much sense, but she said, "It was a marketing-management decision."

If one were to be uncharitable, one might think it a trifle fraudulent to sell $500 compilers that cannot be fully used for lack of a critical element. But it is also possible that rather than knavery, we are witnessing foolishness. Whoever decided to include a cassette port in the PC may have been sufficiently steeped in the toy mentality of the early microprocessors, or perhaps so committed to BASIC that the needs of serious users were not considered.

In any event, those out there who do need the librarian, perhaps if we all scream together either IBM will decide to rescue the librarian, or else Microsoft will unbundle the librarian from C and let us get it. For either love or for money, give us a librarian.

Emanuel Donchin
Champaign, Illinois

Cache/Q Correction

We were quite pleased to see our product *Cache/Q* mentioned in your recent article "Torture Testing dBASE II" (*PCW,* Vol. 1, No. 3). We would like to take this opportunity to point out an inaccuracy in one of the technical specifics: *Cache/Q* buffers sectors accessed, not the whole track. At the same time, the user can determine buffer size and can buffer files according to file extension, name, drive, or directories.

Mike Weiskopf
Corporate Communications Director, Techne
Lafayette, California

Dismantling COMPAQ

Thanks for your detailed review of the COMPAQ computer ("Travels with COMPAQ," *PCW*, Vol. 1, No. 2). I recently bought one and am very happy with it; however, I would probably still be trying to get the cover off if it hadn't been for the explanation and pictures in your article. Unfortunately, installing an 8087 chip requires practically dismantling the whole computer. Oh well. Please keep up the good work in *PC World.* I find your articles very helpful.

Ray Duncan
Los Angeles, California

Word Challenge

Thank you for such a favorable review of *Word Challenge* ("For Game Gourmets," *PCW,* Vol. 1, No. 5). Regarding the problems Mr. Cook described:

We have already dealt with the problem of the small letters in the grid. Since April we have shipped only versions that use capital letters.

As for the game going back to its default values after each match, this will be changed in a future release.

There seems to be a misunderstanding concerning the Embedded Words option. During standard play if you type *strainers,* you receive credit for only that word. However, with the option set to Suffix, you receive credit for *strain, strainer,* and *strainers*. With the option set to All, you receive credit for *rain, train, trainer, trainers, strain, strainer,* and *strainers*. This is an option that most people appreciate because it saves typing.

Chengi Jimmy Kuo
Author, Word Challenge
Proximity Devices Corp.
Ft. Lauderdale, Florida

Business and Pleasure

I sincerely hope that your magazine will not act upon the letter from the Florida businessman (Michael Truffer) in *PCW,* Vol. 1, No. 3. The PC is not just a business tool; it can also be used for education, entertainment, and communications.

Mike Kelleher
Ann Arbor, Michigan

Letters should be mailed to Letters, PC World, *555 De Haro St., San Francisco, CA 94107, or sent electronically to CompuServe 74055,415 or Source STE908.*



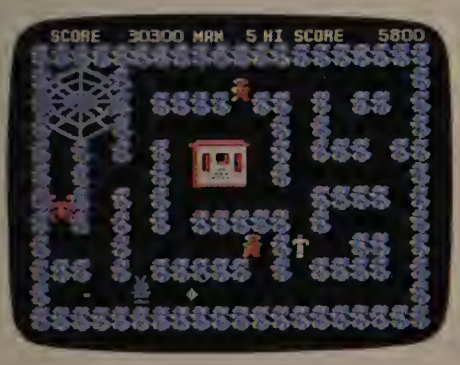
Introducing Night Stalker™ for your Apple and IBM. No wonder some people are afraid of computers.

Now there's a computer game that'll leave everyone hanging from the rafters. Nightstalker™ from Mattel Electronics. Now available for your Apple® II or IBM® Personal Computer.

After all, what could be more fun than being trapped in a cave full of bats? How about being trapped in a maze as well. Underground.



Apple® II, II Plus, and IIe



IBM® Personal Computer

And as if that weren't enough, you've got to watch out for gigantic DDT-resistant spiders. And extremely anti-social robots. Your job? What else? Get them before they get you.

Nightstalker™ from Mattel Electronics. Working nights will never be the same.

NIGHT STALKER

M NETWORK™ by MATTEL ELECTRONICS®

© MATTEL ELECTRONICS, INC. 1983 All Rights Reserved
Apple II, II Plus, and IIe are trademarks of Apple Computer Inc. IBM is a trademark of International Business Machines Corp.



It was love at first sight when Charlie met IRMA, the Decision Support Interface.™ She's the first coaxial cable link between IBM Personal Computers and IBM 3270 networks—the easiest, most economical way there is to get small computers into big business.

Bouquets for IRMA.™



"Excellent—the only proved product of this kind we've seen."

Betty Feezor, Product Manager
Management Science of America, Inc. (MSA)
Atlanta, Georgia

"Like IRMA's response time to the mainframe, comparable to a terminal."

George Pruett, Analyst
Federal Reserve Bank of Atlanta

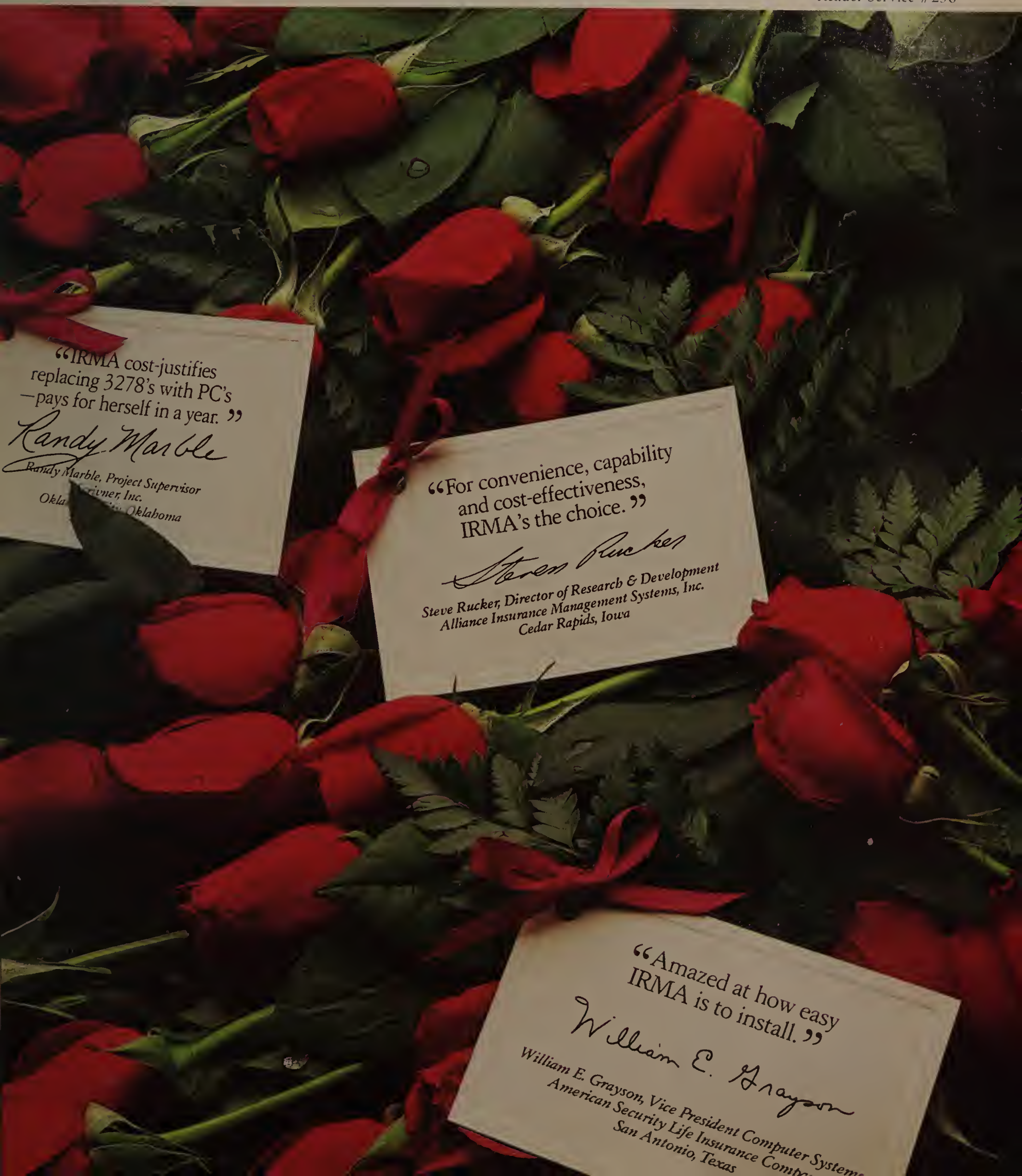
"Couldn't be easier to use. Recommending her for the PC's in our company."

Robert A. Gaither, Manager Technical Support
Inland Container Corporation
Indianapolis, Indiana

Since TAC introduced IRMA in November, 1982, she's helped PC users access, store and evaluate mainframe data in thousands of installations worldwide. Read below what IRMA's admirers have to say about her. And for more information, write TAC, 120 W. Wieuca Road, NE, Atlanta, Georgia 30042. Phone (404) 252-1045, Telex 54-9600. Or you can call us toll-free 1-800-241-IRMA. **Getting computers down to business.**

TAC

Reader Service #256




JEWEL

REVEALED: the best-kept secret in software.



JEWEL.™ A NAME TO KNOW.

Our company's been largely an unknown quantity on the national scene until now. But watch out, we're making our identity public knowledge, and the word JEWEL is bound to spread quickly. Because we happen to have some remarkable products for the computer industry.

JEWEL ACCOUNTING SOFTWARE.

Our systems are easily the most powerful, feature-packed accounting programs available for micro computers. An idle boast? Hardly. For years, JEWEL™ systems have been a pleasant surprise to even the most sophisticated users. Reason? They're far and away superior to the nationally-known companies' micro versions of accounting programs that were originated for larger hardware formats. Ours were written *just for micros.*

- Accounts Receivable & Billing
- Accounts Receivable, Billing, & Inventory Control
- Order Entry
- Accounts Payable
- Payroll
- General Ledger, Standard
- General Ledger, Complete
- Client Write-Up*
- Fixed Assets
- Manufacturing (Bill of Materials)
- Job Costing**
- Medical Accounting
- Personal Tax Package ("What If" & Proforma Tax Planning & Preparation, Prepares State Returns)

*Includes Payroll, Fixed Assets, & Spread Sheet interfaces
**Interfaces with Payroll, Accounts Payable, & Accounts Receivable for progress billings

FULLY INTEGRATED, FULLY INTERACTIVE.

That's not something we say just to sell our packages. It's something designed into our basic accounting concept from the very start that makes us different. *Our* General Ledger is automatically updated by data from Accounts Receivable, Accounts Payable, and Payroll. *Our* Client Write-Up interfaces with Fixed Assets, Payroll, and electronic spread sheets. And *our* Job Costing allows progress billings.

In short, we've got more performance—lots more. And that means much higher efficiency and many more management tools for the business executive. In designing our accounting packages, veteran entrepreneurs guided some of the keenest minds in program writing to meet the needs of growing businesses. After years of proven success and painstaking refining, they'll now be available nearly everywhere.

P.C. LETTERING SYSTEM CONTROL SYMBOL

SYMBOL.™ THE DAWN OF AN ERA.

While JEWEL accounting systems are revolutionizing one area, a breakthrough is coming in another. It's SYMBOL, an amazing system that converts ordinary type into customized graphic art by bending, stretching and altering it to suit just about any whim imaginable. SYMBOL creates exact, sharp-lined configurations of type—outlined, shaded, or solid—and does it automatically after a few simple data entry steps. Dozens of type fonts are available, with more on the way. The implications for charts, plans, signs, reports & presentations are enormous; imagine perfect lettering from fractions of an inch to wall size!

All our software systems are compatible with any MS-DOS version up to 2.0. JEWEL software will be available in multiuser (Ethernet & other networking) as well as Xenix-type formats.

DEALER INQUIRIES INVITED:
JEWEL Business Systems & SYMBOL™
The Heritage Group
611 Anton Blvd., Suite 720
Costa Mesa, CA 92626
TOLL FREE
1-800-227-3283

MANUFACTURERS REPS:
If you're looking for a strong line of exciting products, contact our California office for details about applying to be a JEWEL representative.
TOLL FREE
1-800-227-3283

JEWEL

The Heritage Group
611 Anton Blvd., Suite 720
Costa Mesa, CA 92626
714/662-6999

JEWEL is a registered trade mark of Heritage Holding Inc.

JEWEL Accounting Software © 1983 by Occupational Computing Company

Copyright 1983

Reader Service #409

AST Quality Ad

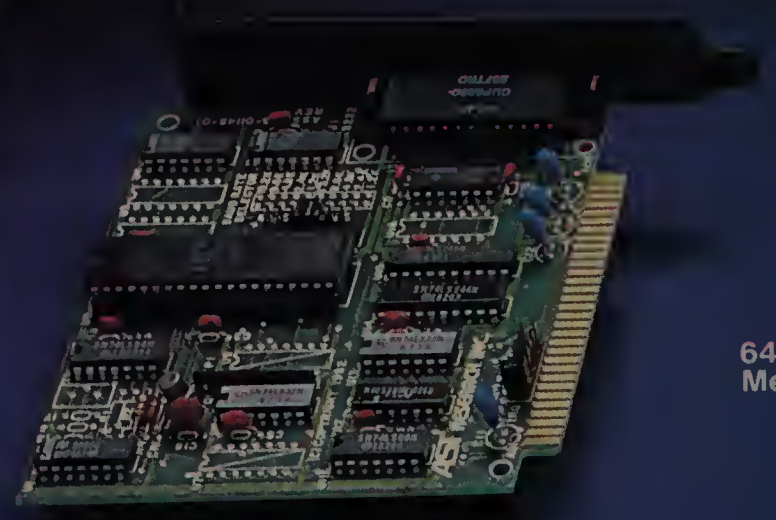
Communications



Advanced Comm. Card (CC-232)

- Programmable to communicate in Bisync, SDLC, HDLC, and Async protocols.
- Two Ports of RS 232

AST products are available from Computerland, Entre; ComputerMart and selected dealers worldwide. Call factory if your dealer does not have the AST products you want.



CC-332 For use with AST-3780

- An IBM 2780/3780 RJE Emulator • Supports Bisync point-to-point communications protocol • Allows file transfer between Host & IBM PC • Ideal for IBM **System 34, 38, 4300**

AST-SNA

- Emulates IBM 3274 Model 51C Control Unit
- Emulates 3278 Display Station • Emulates 3278 Type Printer • Optional 3770 Emulation • Cluster Controller Operation • Protocol Converter Support



ComboPlus™

Standard Feature

- 64K-256K Memo
- One Battery Back up Clock • One IBM Compatible Async
- One IBM Compat Printer Port • Supe Drive™ • SuperSpo
- From $395

western union **Telegram**

TO: ALL IBM PC USERS

FROM: TOM YUEN, VP MARKETING, AST RESEARCH, INC.

COMBOPLUS VOTED NUMBER ONE IBM PC COMBO BOARD AND SUPERDRIVE VOTED NUMBER ONE IBM PC DISK EMULATOR BY READERS OF PC WORLD. SEE THE WINNERS AT YOUR COMPUTER DEALER.

YOU DID IT!
YOU VOTED US NUMBER ONE.

You have voted ComboPlus and SuperDrive the champion of the World Class competition in *PC World's* user survey, winning as the best Combo Board and best Disk Emulator. We are honored. Thank You. As you know, ComboPlus gives you 64K – 256K expansion memory, a clock, a calendar, a serial port, and a parallel port all on a single board. SuperDrive, included in our SuperPak™ system utility software package*, lets you simulate up to four electronic disks. Both help you get the most out of your IBM® PC. And both offer the exclusive AST "Plus" — our unsurpassed quality, reliability, after-the-sale-support, and overall design excellence — that comes with all our products.

See ComboPlus and SuperDrive in *PC World*'s display at the IBM PC Faire in San Francisco, and at PC '83 in Boston. See all the AST Number One IBM PC Add-Ons at your Computerland, Entre, Businessland and other computer stores worldwide. If your dealer doesn't have them, call us. We'll recommend a dealer who does. AST Research Inc., Irvine, California. (714) 540-1333. TWX: 295370ASTRUR.

AST RESEARCH INC.

*SuperPak includes SuperDrive, SuperSpool and Clock Utility programs.
IBM is the registered trademark of International Business Machines.

AST **NUMBER ONE ADD-ON PRODUCTS FOR IBM® PC**

Reader Service #18

I-On Products

Multifunction Cards

NOW! New Product Highlight

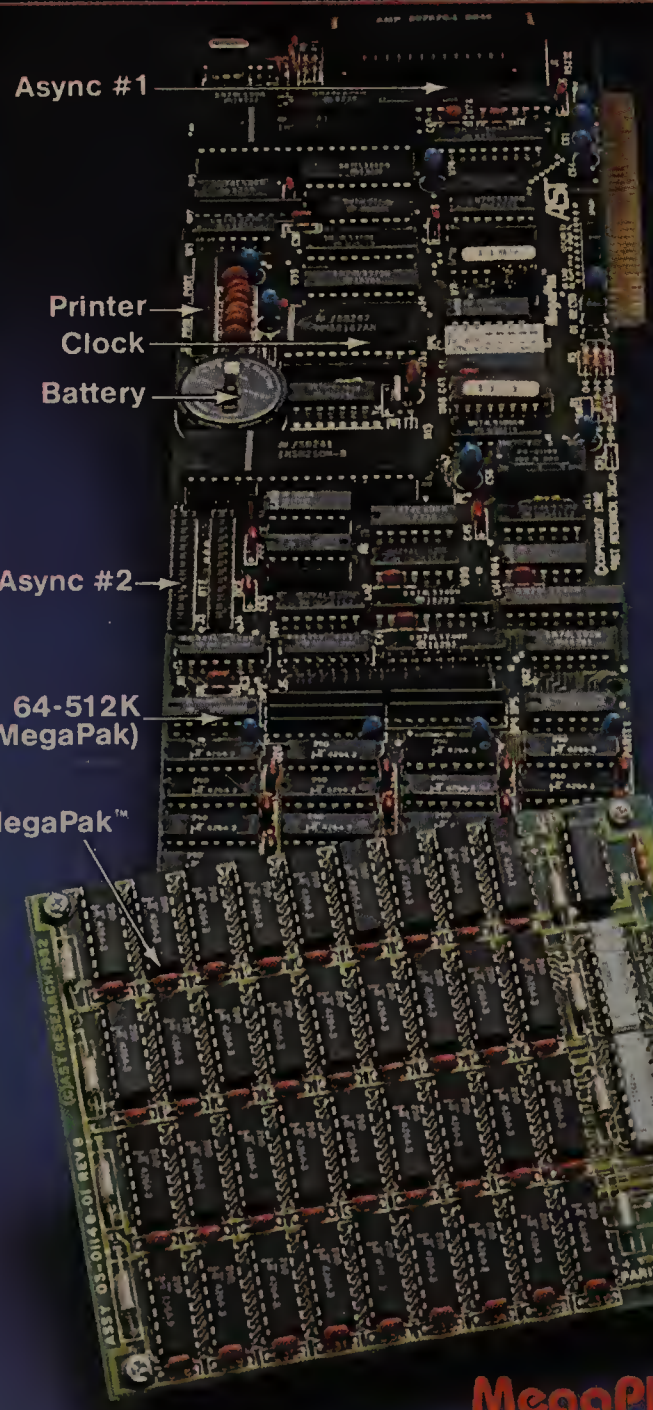
AST-5251 – An interactive IBM 5251 Model 12 remote work station emulator using PC

PCnet® – A Local Area Network for IBM PC featuring disk sharing, file locking, printer sharing and supports up to 64,000 PCs. One M bit CSMA/CD technology using 75 ohm CATV Cable. Hundreds of PCnets have been installed in IBM PCs.

PlusModem™ – Integrated Direct Connect 212, 1200 band auto-dial modem, clock, game port, printer port and second Async port.

Call Factory For Details



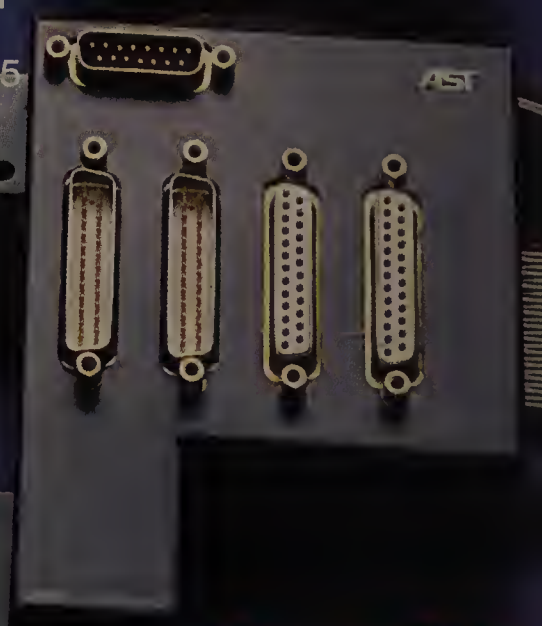


New! With Game Port

I/O Plus II™

is an enhanced version of I/O Plus featuring: • One Clock Calendar (std.) • Two IBM Compatible Async Ports (1 std., 1 opt.) • One IBM Compatible Printer Port (opt.) • One IBM Compatible Game Port (opt.) • SuperDrive™ • SuperSpool™ • From $165





MegaPlus™

• 64K-512K (with MegaPak) • Two IBM Compatible Async Ports (1 std., 1 opt.) • One IBM Parallel Printer Port (opt.) • One Battery Backed-up Clock Calendar (std.) • SuperDrive™ (std.) • SuperSpool™ (std.) • Ideal for Concurrent CP/M, MBA, VISI Series software packages.

ConnectALL™

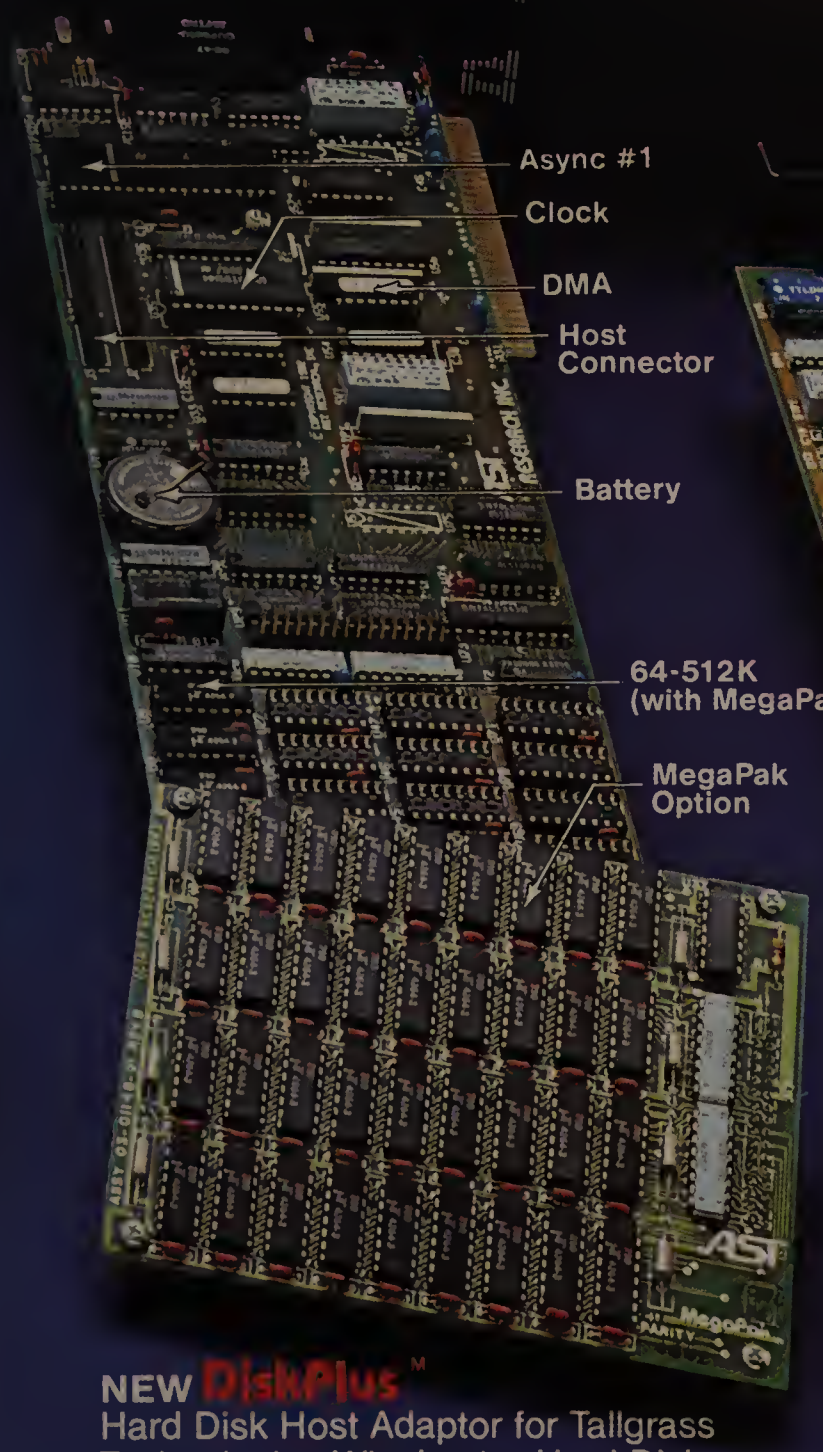
NEW! AST Proprietory Connector Mounting Bracket for PC only (does not include cables shown in illustration)

IBM is the registered trademark of International Bu
PCnet® is the registered trademark of Orchid Techr
is developed by Wilmot Systems Inc. and AST Res

for IBM® PC/XT

Other Enhancements





NEW DiskPlus™
Hard Disk Host Adaptor for Tallgrass Technologies Winchester Hard Disk Systems. Now with Clock, 1 Async Port, 64K-512K Memory, and DMA.

ExpansionMemory
- 64K-256K Parity Memory
- SuperDrive™
- SuperSpool™
- New Price $295

AST RESEARCH INC.
2372 Morse Avenue
Irvine, Calif. 92714
(714) 540-1333
Dealer Inquiries Welcome

ess Machines.
gy. AST-3780
ech, Inc.

dUTIL, QUICKCODE, and dGRAPH are trademarks of Fox & Geller, Inc
dBASE II is a trademark of Ashton-Tate

dBASE II™ made better.

FOX & GELLER

"the products make the difference."

When you create a line of products that make dBASE II easier, more fun and faster to use you make dBASE II better. And that's exactly what Fox and Geller products are designed to do!

QUICKCODE MAKES IT EASY

No programming. That's what makes QUICKCODE, THE dBASE II program generator by Fox & Geller so easy to use. With QUICKCODE you can generate a customer database in 5 minutes or write concise programs for any type of database. QUICKCODE is the most powerful, easiest to operate program generator ever.

dGRAPH MAKES IT FUN

Fox & Geller combine database with graphics to create dGRAPH, the exciting new dBASE II graphics system. Imagine, you can actually teach your dBASE II to draw three different types of graphs. Think of the impact! Think of the fun!

dUTIL MAKES IT FAST

dUTIL is Fox & Geller's utility program for dBASE II. dUTIL combines your dBASE II command files to automatically produce a faster running time. A consistent favorite among dBASE II users.

Call us at (201) 794-8883

FOX & GELLER products make dBASE II even better!

FOX&GELLE

Fox&Geller, Inc. 604 Market Street Elmwood Park, N.J. 07407 (201) 794-88

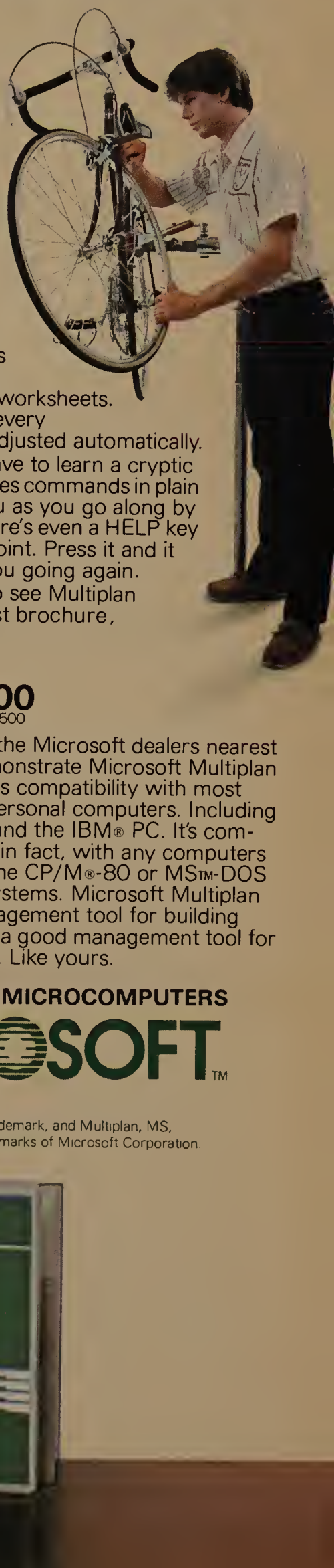
Reader Service #

"Microsoft® Multiplan™ allows me to explore more alternatives in less time. I think it leads to better management decisions."

Edward R. Schwinn, Jr.
President, Schwinn Bicycle Company

"Multiplan software helps me make better business decisions. It's as simple as that. With Multiplan on my microcomputer, I can explore a number of alternatives faster. That's really important to me in planning and tracking my totally hand-crafted Schwinn Paramount Bicycle. As with anything handmade, cost control and product planning are major considerations. For instance, Multiplan lets me study the effect of the learning curve on overall productivity. And although we have a mainframe computer, I find that Multiplan is a tool that allows me to personally examine my business options—without spinning my wheels."





A tool for decision makers. Microsoft Multiplan is a microcomputer software program that can help you too. In many ways. You can analyze cash flow. Plan budgets. Forecast income. Manage production. Multiplan allows you to set up an electronic worksheet for whatever your need may be. And, it lets you explore alternatives faster because when you make one change you immediately see the results of that change throughout the worksheet and on any related worksheets. Just change one number and every number that depends on it is adjusted automatically.

In plain English. You won't have to learn a cryptic language to use Multiplan. It takes commands in plain English. And, it will prompt you as you go along by telling you what to do next. There's even a HELP key in case you need help at any point. Press it and it gives you information to get you going again.

See it in action. If you'd like to see Multiplan in action, and receive our latest brochure, call us toll-free:

DEPARTMENT NO.
1-800-547-3000
In Oregon, call collect 503-244-5500

We'll gladly locate the Microsoft dealers nearest you. They'll demonstrate Microsoft Multiplan and explain its compatibility with most popular personal computers. Including Apple® and the IBM® PC. It's compatible, in fact, with any computers that use the CP/M®-80 or MS™-DOS operating systems. Microsoft Multiplan is a good management tool for building bicycles. It's also a good management tool for building businesses. Like yours.

BETTER TOOLS FOR MICROCOMPUTERS

MICROSOFT™

Microsoft is a registered trademark, and Multiplan, MS, and the Microsoft logo are trademarks of Microsoft Corporation.

Bits of Speech

Henry Polard

Speech technologists are discovering new ways to enter data and receive output, enabling microcomputers to do what only mainframes could do formerly. Instead of relying on keyboards, joysticks, or mice, people today can talk to their computers. They can also listen to their computers talk as information traditionally conveyed by display messages and printouts is communicated by synthesized or stored computer speech. This article explores speech technology and describes the methods, applications, and products currently available for the IBM PC.

Wouldn't it be great to be able to program or enter data to a computer verbally? No clumsy typing, no program crashes because of missing or wrong punctuation, no eye-straining monitors—not even a mouse. Having the computer talk to you would also be great; it could teach you a foreign language, verify the data you entered, or talk you through a tutorial about itself when you needed help. These applications are now becoming available to personal computer users.

In general, speech recognition and verbal output are most useful in situations in which a person's hands or eyes are needed away from the computer. In the case of verbal input, this means situations like inventory taking, in which your hands are moving objects around and your eyes are checking quantities, or laboratory work, in which your hands are busy operating equipment and your eyes are looking through a microscope or watching gauges. In terms of vocal output, applications include status warnings, as when something is overheating, or progress indications, such as calling out the floors in an elevator—whenever attention is not likely to be focused on the computer.

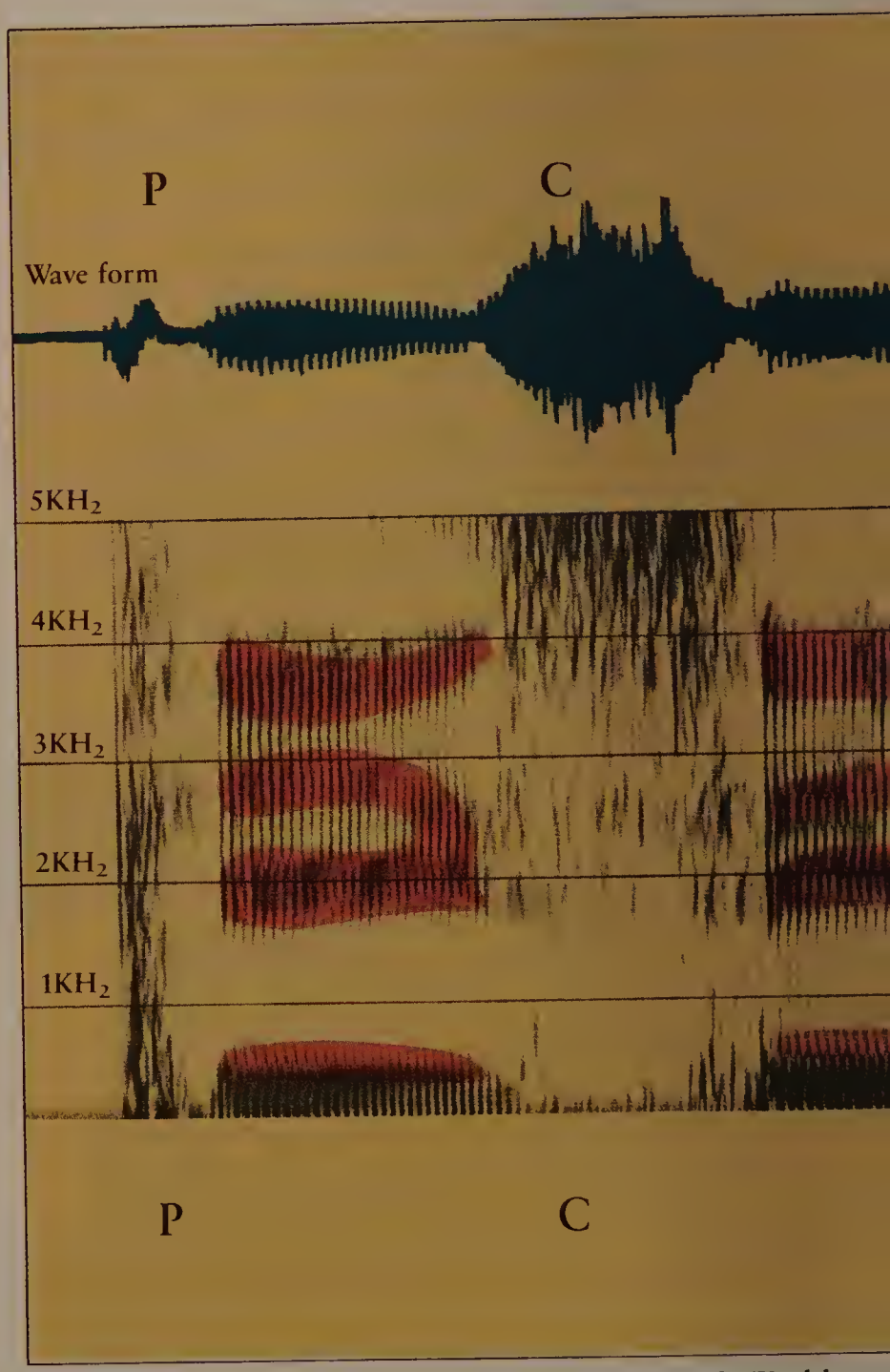
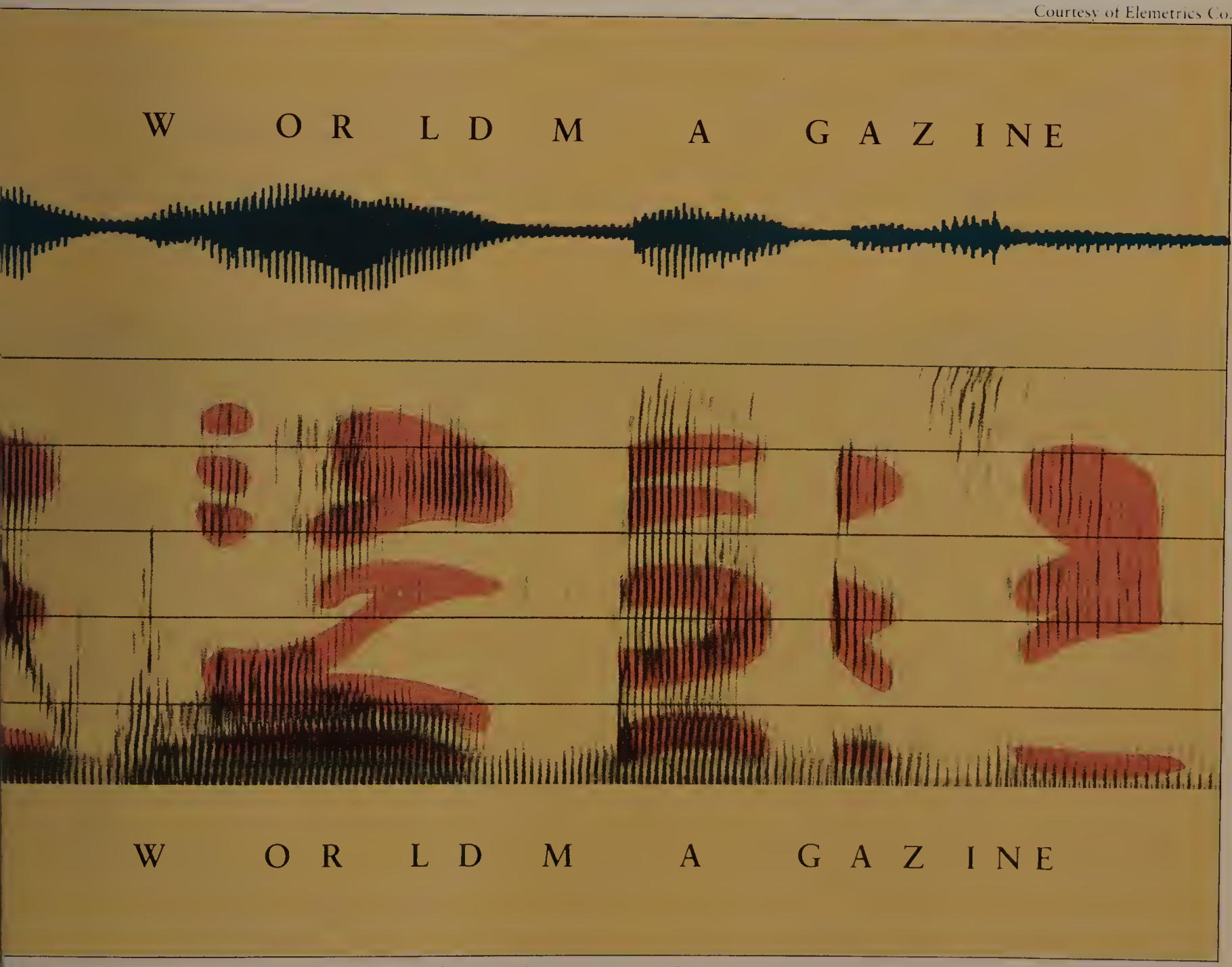


Figure 1: Speech spectrogram of the words "PC World magazine." The spectrogram shows frequency versus

Courtesy of Elemetrics Co.



time versus amplitude. The stronger the signal at a frequency, the darker the line. Vertical striations indicate individual vibrations of the vocal cords. Formants of vowels are shaded in color.

State of the Art

Speech

Let's examine speech itself. Speech is sound produced by people that transmits information about such things as the physical environment or our mental and physical activities. There is no limit to the number of things you can say in any one human language, and there is variation within a language—each person who speaks English, for example, has a particular voice, an individual style of speaking, and a distinct way of writing.

Examining the sounds of a language, we find that the sound pattern of any language has regular variations that its speakers may not be conscious of. *Phoneme* is the term linguists use to refer to a set of sounds that function as one unit in a given language. For example, the English phoneme *t* is composed of four sounds. In *top*, the *t* is followed by a puff of air strong enough to blow out a match held a couple of inches from the lips; in *stop*, however, no such puff of breath follows the *t*. In *pot* the breath is stopped and the consonant is not even released. In *betting*, when said at a conversational speed, the *t* is sounded as a quick *d*; the word is actually pronounced just like the word *bedding* said at the same speed. Phonemes have no connection with spelling. *To*, *too*, and *two*, for example, are composed of the same phonemes.

In physical terms, when speech sounds are made the vocal tract creates and changes cavities in which certain frequencies resonate. These frequencies may be produced by the vocal cords or by air moving through constrictions, as in the *s* sound. We are usually unaware of each resonance, or *formant*, in the words we speak. Two resonances may be sounded by flicking a finger against your cheek and against your throat just above the Adam's apple. It is best to try this while shaping your mouth to say vowels but not actually saying them. The formants appear as dark bands on a graph called a speech spectrogram (see Figure 1).

The human voice produces many formants, but only four of them are essential to understanding English. The other formants are heard as the qualities that give voices individuality. Because each vocal tract is unique, a person's individual formant pattern can be analyzed and used in the same way as fingerprints.

Computers and Speech

Speech products for microcomputers perform one or more of the following functions: storage, which includes recording and playing back speech; synthesis, which is the creation of speech; and automatic speech recognition. Often speech-product manufacturers label speech storage as synthesis because speech storage involves analysis, storage, and synthesis. You should examine prod-



Computereyes is a trademark of Caere Corporation. IBM is a registered trademark of International Business Machines Corp.

ucts carefully and note what they really do before buying.

Speech storage devices work like very sophisticated tape recorders, the important difference being that speech storage devices enable you to program stored words together to create a variety of messages. For example, if you want an alert to be announced when any

> It takes 64,000 bits of memory to store 1 second of speech.

one of ten boilers is overheating, you need to record only 12 phrases: "attention, boiler number," "is overheating," and the numbers one through ten. The program for this application would select the appropriate number, depending on the signal received by the computer from the boilers, and insert the number between the first two phrases. You may enjoy thinking up a dozen phrases relevant to your applications and seeing the variety of messages you can come up with by combining them. An example of a speech storage product is *Supertalker II*, by Mountain Computer, Inc. (see *PCW*, Vol. 1, No. 4 for a review).

Other important applications of speech storage include sending verbal memos (voice mail), leaving verbal messages (voice store and forward), sending verbal messages via telecommunications (vocoding), and recording verbal commentaries about written material.

Time-Domain Synthesis

There are two popular ways for computers to store speech: time-domain synthesis and frequency-domain synthesis. With the time-domain synthesis process, the waveform of a signal coming from a microphone or telephone is analyzed (see Figure 2). In the simplest form of this method, called pulse code modulation (PCM), the strength of the signal (the amplitude of the waveform) is sampled at regular intervals, and numbers representing the signal strengths are stored in sequence. The conversion to numbers is carried out by an analog-to-digital converter, which acts somewhat like a modem. To play the word or phrase back, the signal is reconstituted by retrieving the numbers in sequence from memory and sending out a signal whose strength corresponds to the numbers that have been retrieved. Usually, the transition from numbers to a continuous wave is made by a separate hardware device, a digital-to-analog converter.

The number of samples taken during time-domain analysis must be twice as great as the highest frequency of the speech signal to avoid losing information about



COMPUTEREYES.™

Now you can give your computer eyes. Eyes for faster, more accurate data input without using a keyboard.

Computereyes is the error-reducing high-speed input peripheral for entering data. From order entry to accounting to the factory floor to shipping & receiving.

It electronically reads data and enters it into practically any host computer and terminal system with one sweep across human-readable OCR-A alphanumeric characters. At up to 200 characters per second.

Computereyes comes in both hand-held wand readers and desktop slot readers, complete with standard parallel or RS-232C serial interfaces, and as a single-board IBM PC enhancement.

To find out more, call or write for our color brochure. Caere Corporation, 100 Cooper Court, Los Gatos, CA 95030, (408) 395-7000. TWX No. 910-597-5391.

Computereyes. The peripheral with vision.

THE WORLD LEADER IN EYE-TECHNOLOGY.

CAERE CORPORATION



Reader Service #349

State of the Art

the waveform. The larger the number of amplitude samplings stored, the more accurately the utterance can be reconstructed. Since 4000 Hz is the highest frequency that needs to be stored for comprehensible speech, accurate time-domain analysis requires 8000 samples per second. According to the United States sampling rate standard for telephone speech transmission, numbers 8 bits long are required to store the amplitude of each sampling. Using the 255 levels of amplitude that can be stored in 8 bits, it takes 64,000 bits of memory to store 1 second of speech (8000 samples per second x 8 bits). This amounts to 8K bytes per second of speech stored.

Although storing speech using as little memory as possible is desirable, it is impossible to cut back from the standard just described and retain the same level of accuracy, or fidelity. The less information about something you have, the less accurately you can reconstruct it. The trade-off between memory requirements and fidelity of reproduction is an important aspect of speech technology.

One approach to reducing memory needs is to eliminate redundant information about the waveform.

One approach to reducing memory needs is to eliminate redundant information about the waveform. This process is called speech compression and is analogous to freeze-drying coffee. The redundant and unwieldy information in the case of coffee is water. When water is eliminated from coffee, the coffee is easy to store and transport. However, in the process the quality of the coffee is compromised, as a comparison between reconstituted freeze-dried coffee and freshly brewed coffee shows. Similarly, reconstituted, or synthesized, speech does not sound the same as spoken speech.

One way of eliminating redundant information from a waveform is to calculate and store only the change in the amplitude of the waveform between one sampling period and the next. An increase in amplitude is stored as a 1, a decrease as a 0, and silence as alternating 1s and 0s. This process, known as delta modulation, requires fewer bits per sample than PCM since recording the relative change in amplitude takes only 1 bit per sample. Delta modulation, however, requires more frequent sampling than PCM.

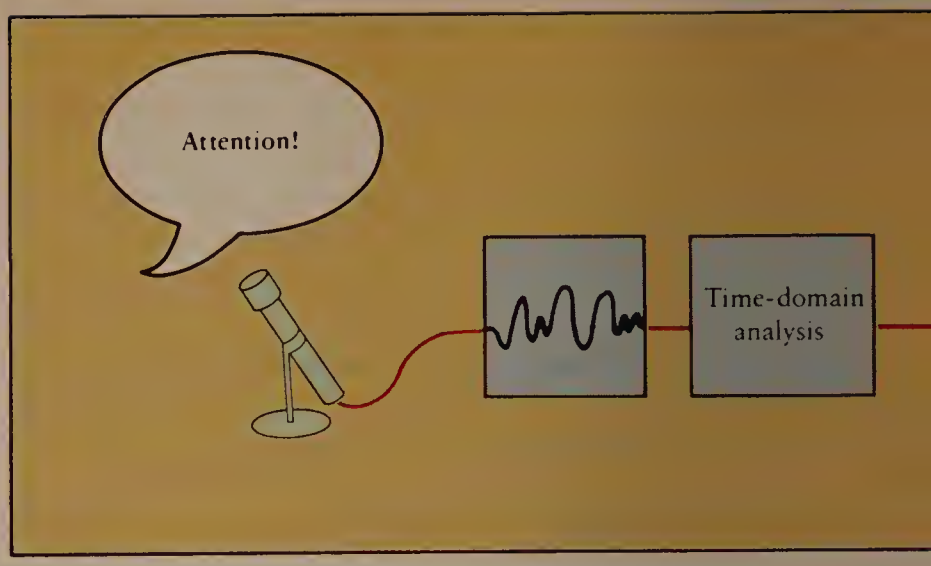


Figure 2: Time-domain synthesis

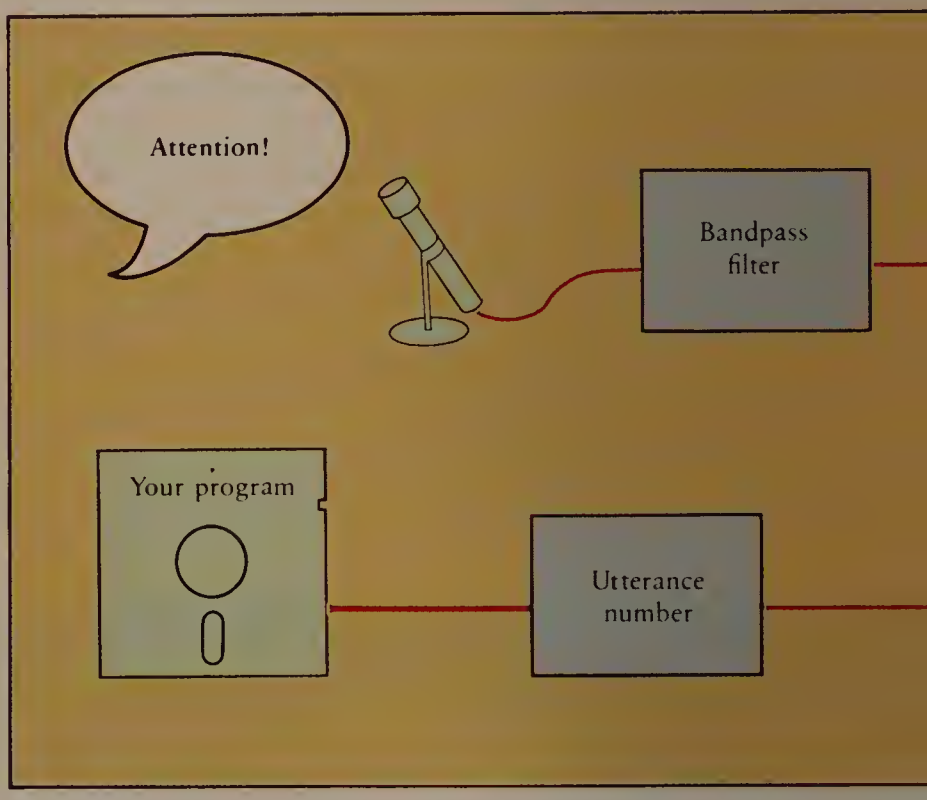


Figure 3: Frequency-domain synthesis (linear-predictive coding)

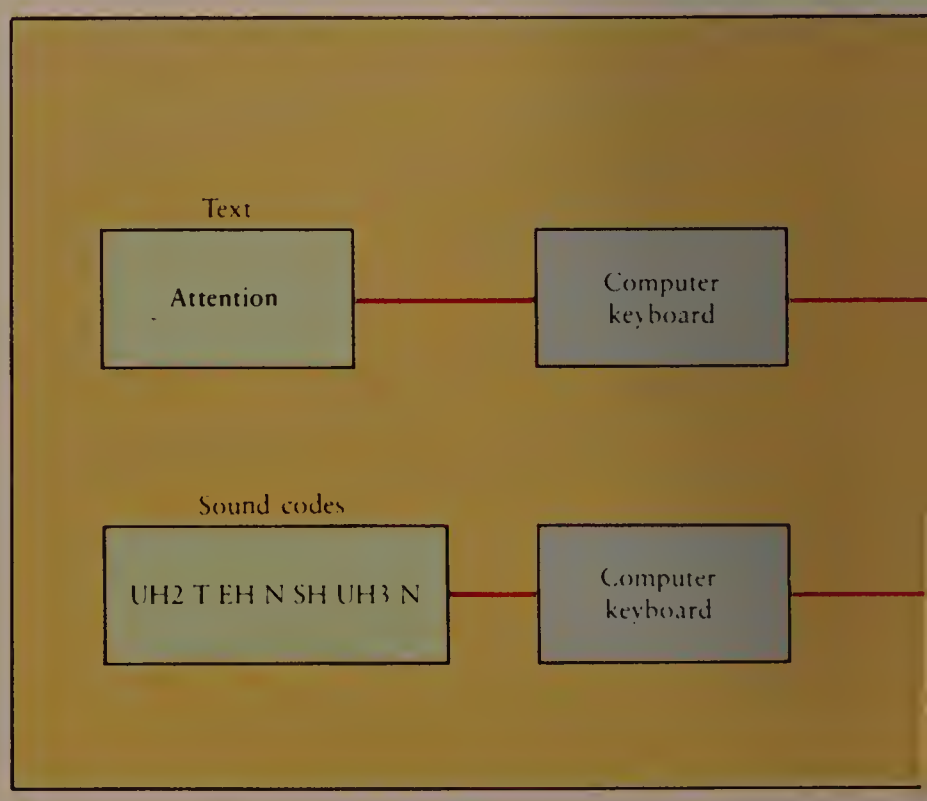
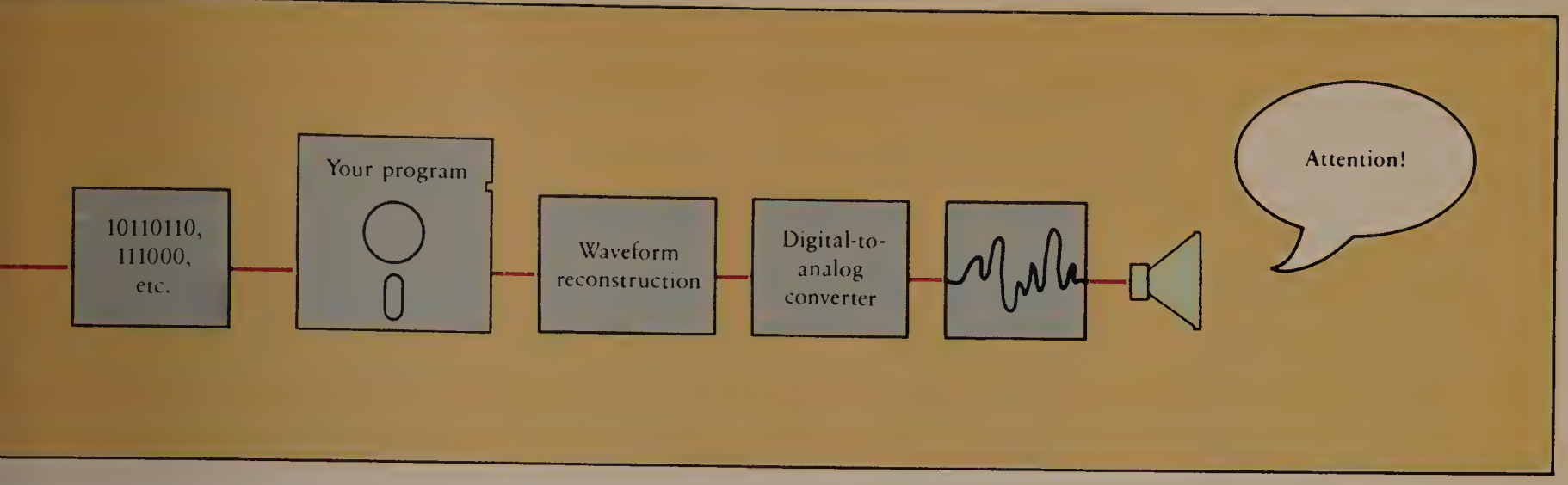
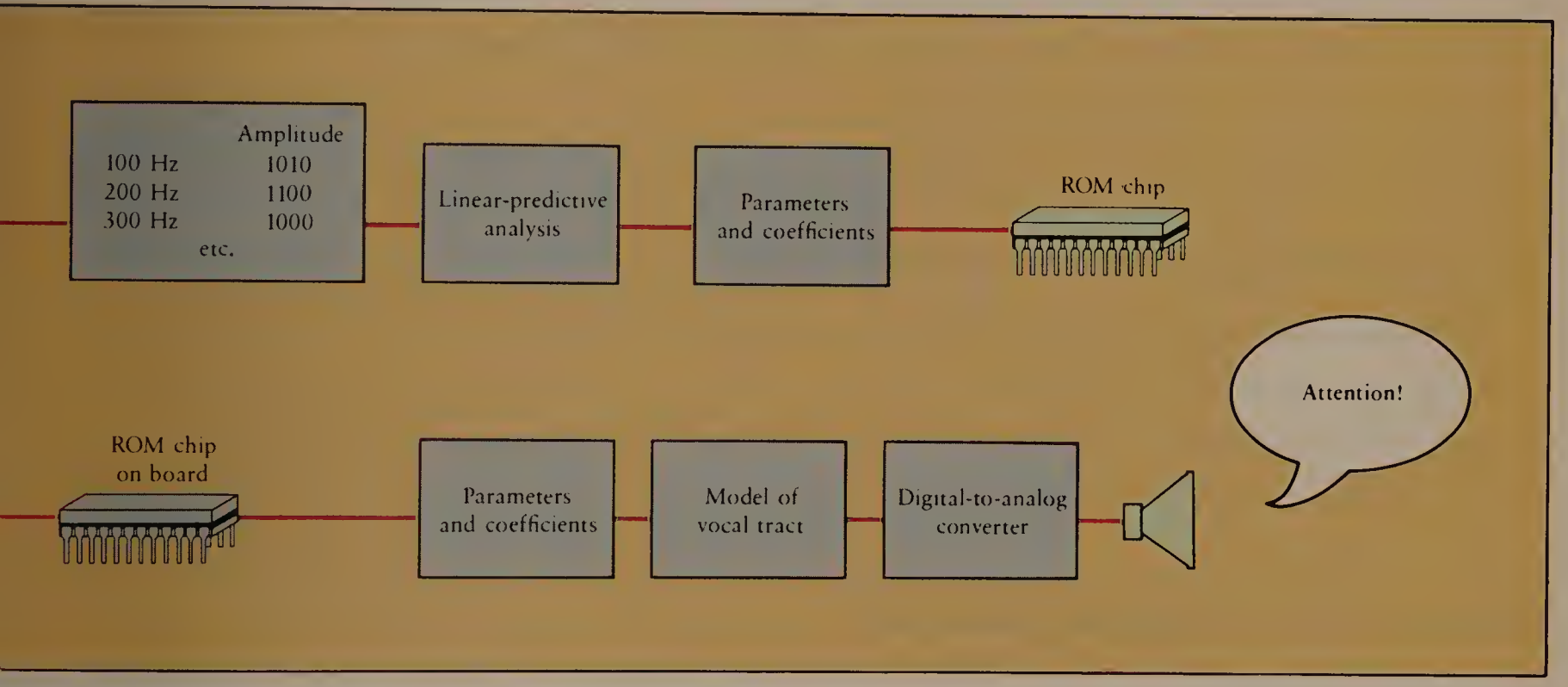
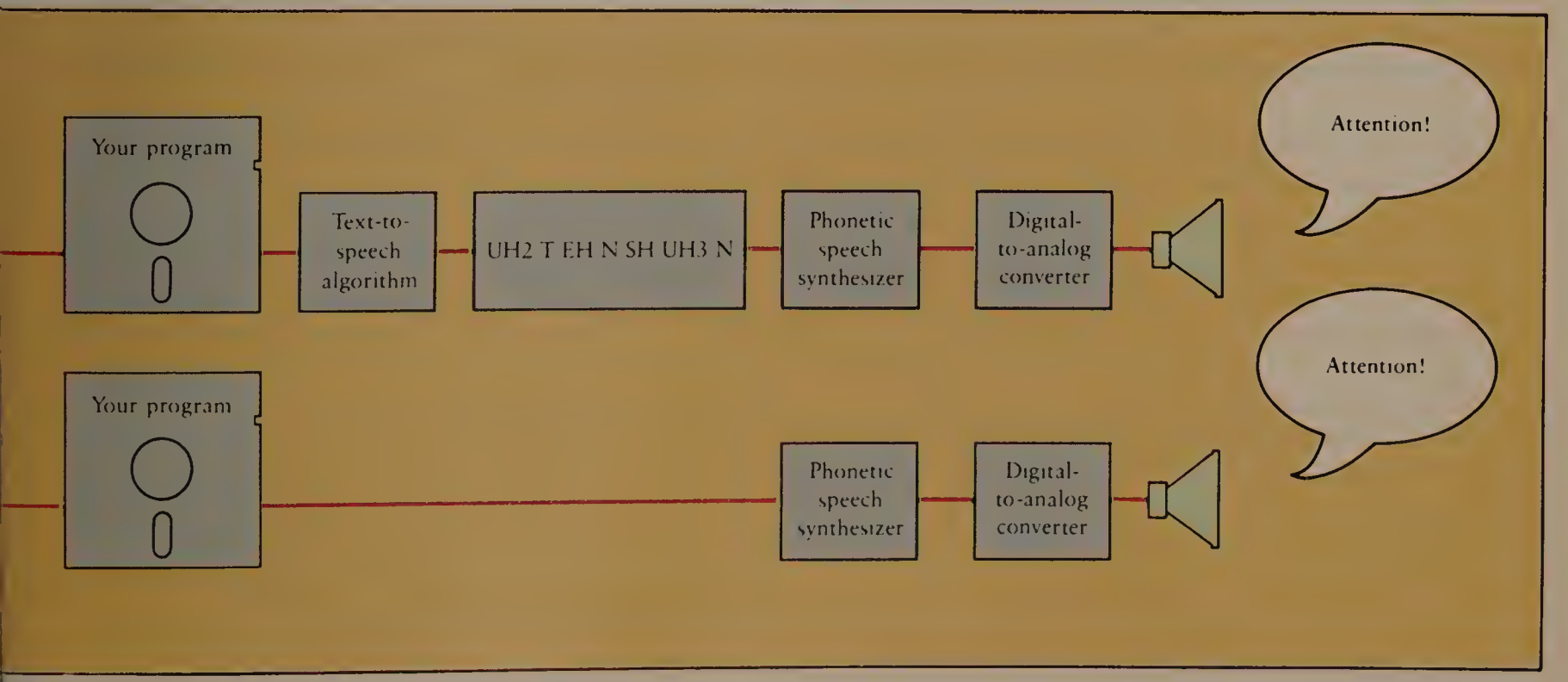


Figure 4: Phonetic synthesis


10110110,
111000,
etc.
Your program
Waveform reconstruction
Digital-to-analog converter
Attention!


Amplitude
100 Hz 1010
200 Hz 1100
300 Hz 1000
etc.
Linear-predictive analysis
Parameters and coefficients
ROM chip
ROM chip on board
Parameters and coefficients
Model of vocal tract
Digital-to-analog converter
Attention!


Your program
Text-to-speech algorithm
UH2 T EH N SH UH3 N
Phonetic speech synthesizer
Digital-to-analog converter
Attention!
Your program
Phonetic speech synthesizer
Digital-to-analog converter
Attention!

State of the Art

A variation on this basic space-saving principle, adaptive delta pulse code modulation, varies the significance of a 1 or a 0 bit based on the history of the signal. This leads to even greater memory savings.

On playback, the information about the waveform is retrieved from memory, the process is reversed, and the results are sent to a digital-to-analog converter to be converted into sound.

Frequency-Domain Synthesis

In frequency-domain synthesis, an incoming utterance is analyzed in terms of the loudness of individual frequencies of a speech sound (see Figure 3). The results of the analysis are related to a mathematical model of the vocal tract. This process involves many complex calculations.

Encoding hardware for frequency-domain synthesis is not available for personal computers. Only decoding hardware and ROM chips containing encoded words and

> The automatic speech recognition products currently available for personal computers recognize only utterances bounded by a period of silence.

phrases are sold by personal computer speech-product manufacturers. Each word or phrase stored by the manufacturer can be accessed by using a number that requires only a few bits, since the utterances are on a board separate from main memory.

Linear-predictive coding (LPC) is the major type of frequency-domain synthesis used in the United States. In this method speech is analyzed digitally in terms of coefficients and parameters, each representing one aspect of speech, such as overall pitch or amplitude at a given frequency. These coefficients and parameters are stored in ROM chips. Knowing the characteristics of the vocal tract, engineers can predict future coefficients and parameters based on past patterns. For example, the regularity of vowel sounds makes them predictable; to save memory, you need to store only the basic configuration of the vocal tract for a desired vowel sound and a duration for the sound.

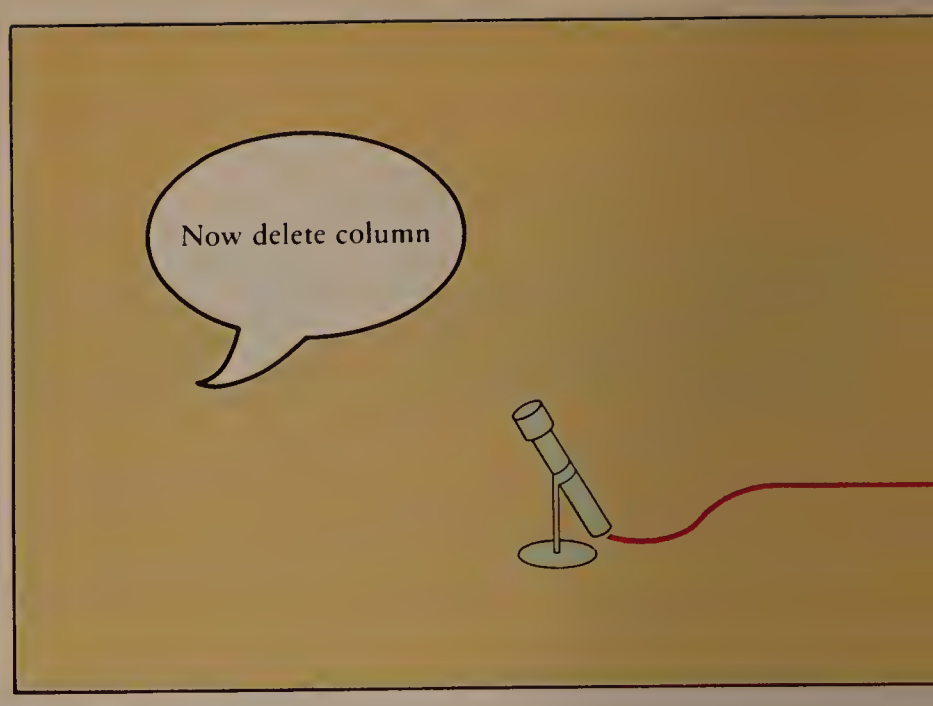


Figure 5: Speech recognition

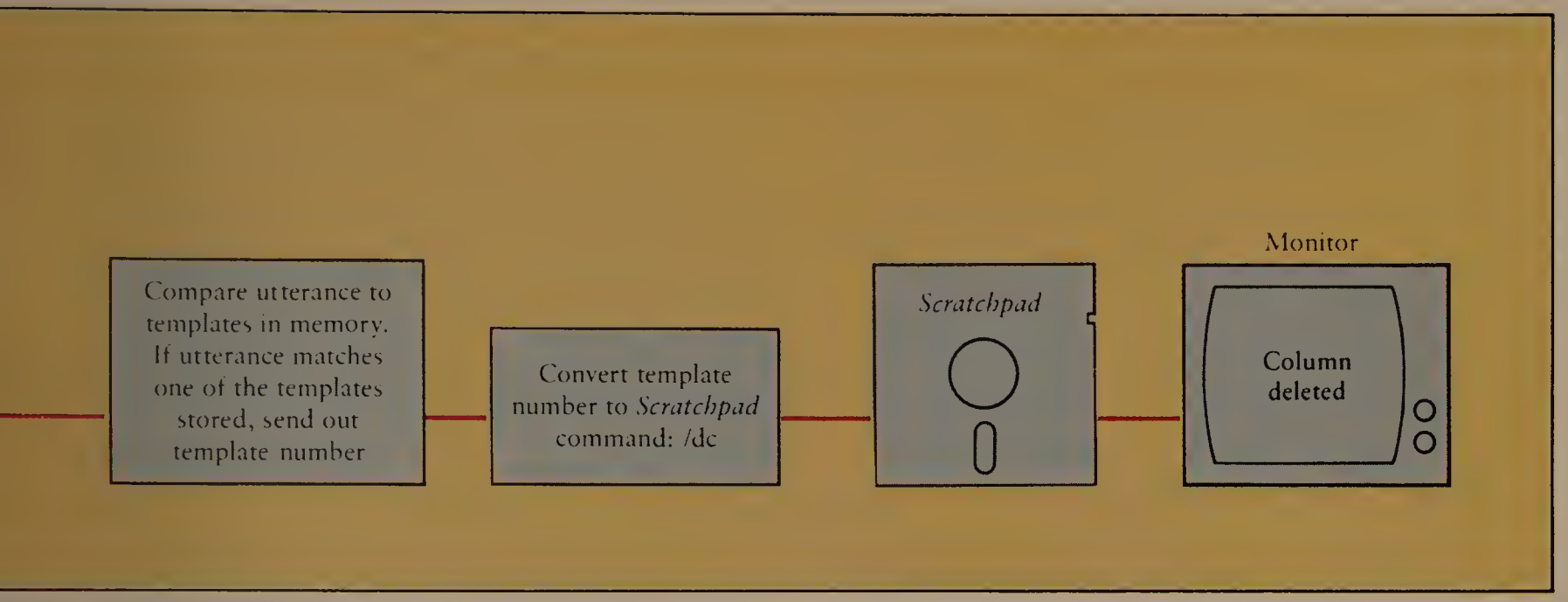
When an utterance is to be played back, the parameters and coefficients are retrieved from ROM and drive a digital simulation of the vocal tract. This simulation sends out speech through a digital-to-analog converter. With LPC, only 800 bits, or 100 bytes, need be stored per second of speech.

Phonetic Speech Synthesis

Phonetic speech synthesis is the least expensive speech technology. The process creates speech from scratch, with no input from a human voice (see Figure 4). With phonetic speech synthesis, you type in the code for a speech sound, such as "oh" or "ah." A code from the keyboard selects a block of memory in the synthesizer that contains the directions to operate a simulation of the vocal tract, and the sound is produced. In one method of speech synthesis, LPC parameters and coefficients are stored and drive an LPC model of the vocal tract. In another approach, variable filters modify sound from an oscillator to produce the formants of vowels, and a noise source connected to another filter generates hissing sounds such as those represented by *f* and *sh*.

The sound produced by speech synthesizers sounds artificial in comparison with stored speech. The artificiality comes from the fact that the words and phrases of synthesized speech are composed of separate sounds in sequence, without the transitions between sounds that characterize normal speech.

With speech synthesizers, however, there is no limit to vocabulary or length of utterance, since any combination or number of sounds can be specified by putting the appropriate symbols in a program or entering them via a keyboard. Using stored speech is like a situation in which the amount of coffee you can carry is limited by



the size of your thermos. Using speech synthesis is like having a device that can produce an unlimited amount of artificial coffee.

Given the ability to produce an unlimited number of sequences of sounds when you input sound codes, using phonetic synthesis you can type in words and have the synthesizer produce the sounds. This conversion of spelling to sound is done with text-to-speech algorithms. These algorithms usually take up 6K of memory each. The quality of these algorithms varies, since predicting pronunciation from English spelling requires many rules. The greater the number of rules and exceptions, the greater the accuracy, cost, and memory requirements to produce comprehensible speech. Because some spellings are ambiguous (*read*, for example, can be pronounced in two ways), it is sometimes necessary to type in sound codes that access speech sounds directly.

The sounds produced by typing in sound codes last an average of 100 milliseconds. At 8 bits per sound, including intonation and pitch, 1 second of synthesized speech uses only 80 bits (10 bytes) of memory.

Speech Recognition

Automatic speech recognition devices accept speech input rather than keyboard input (see Figure 5). This input activates parts of programs so that the computer seems to obey verbal instructions. The automatic speech recognition products currently available for personal computers recognize only utterances bounded by a period of silence. Speech products that recognize continuous speech must locate the boundaries of an utterance. In true recognition of continuous speech, utterances have to be parsed (analyzed for grammar and meaning), and appropriate signals have to be returned to the main program for each unit parsed. An instruction such as, "Send copies of the following memo to all district managers," could be executed after the parsing process. Speech recognition at this level of sophistication is available only on mainframe computers.

Another type of speech recognition procedure consists of matching a stretch of speech to a pattern, called a template, that is stored in memory. Using statistical methods, distance evaluations, and dynamic programming to find the least degree of difference between two patterns, speech recognition products compare a set of templates to an incoming signal. Through complex algorithms the closest match is determined from all possible matches. For every match attempted, the algorithms must account for variations, since no word is said exactly the same way twice.

> The sound produced by speech snythesizers sounds artificial in comparison with stored speech.

When an incoming utterance is matched to a template, a signal is returned to the computer program, which branches based on whether the signal indicated a successful match or not.

Templates may be entered either by the speaker or by the manufacturer. Templates are entered by the

speaker in the case of speaker-verification systems, which match only the voice of a particular speaker to the template. Templates are also entered by the speaker in speaker-dependent systems, which recognize the voice of the original speaker and possibly those of other speakers. The vocabulary of speaker-verification and speaker-dependent systems is limited only by the memory of the computer. In the case in which a match is to be made to a template regardless of the individual speaker (speaker-independent systems), the templates are usually entered by the manufacturer and the vocabulary is quite limited.

The actions that can be executed given a successful match of speech signal to template are unlimited and may range from dimming the lights in a room to activating a file to make more vocabulary available. Theoretically it would be possible to link an utterance to a

Talking Technology

The following is a list of speech products available for the IBM PC. The products are of three types: speech storage, phonetic synthesizers, and speech-recognition. Many of these products are versatile and will surprise you with their wide variety of applications.

ComNet
A telephone interface that enables you to phone a computer and leave or retrieve messages and request specific information. List price: $1695 to $2995. Tecmar, 23600 Mercantile Rd., Cleveland, OH 44122, 216/349-0600.

Heuristics 7000
A speech recognition unit that has a capacity of 64 words or phrases that can last up to 3 seconds each. The system is expandable to 128 words. It offers 99 percent speech recognition and requires an asynchronous port. List price: $3000. Heuristics, 1285 Hammerwood Ave., Sunnyvale, CA 94086, 408/738-8532.

Intex Talker
A phoneme-based speech synthesizer that has 64 inflection levels. It includes a 6K text-to-speech algorithm, phoneme access, and spelling output modes. It comes with an expandable 750-character buffer, adjustable baud rate, and asynchronous and parallel connectors. The system requires an asynchronous port. List price: $295; $25 each for optional loudspeaker, 2700-character buffer, or user-programmable memory board with a directly accessible 6502 microprocessor. Intex Micro Systems Corporation, 775 W. Big Beaver Rd. #1717, Troy, MI 48084, 313/540-7601.

Key Tronic Voice Input Device
A board that integrates voice recognition as part of the keyboard output. It recognizes approximately 100 phrases and includes a keyboard, a microphone, and a mouse. It requires one disk drive. List price: $1200. Key Tronic, P.O. Box 14687, Spokane, WA 99214, 509/928-8000.

Parle PC
A synthesizer that has an unlimited user-defined vocabulary and synthesizes foreign words. It includes an amplifier and a speaker. The system stores 1 second of speech in 10 bytes and enables the synchronization of external events with speech output. List price: $199. GM Enterprises, 485 E. Granville Ave., Roselle, IL 60172, 312/893-1171.

Speech 1000
A board that stores more than 6 minutes of speech (approximately 540 words). It requires an asynchronous port. List price: $1200, $2500 boxed with power supply, $3.50 per word from stock list, $50 per word custom stored. Speech Plus, 461 N. Bernardo Ave., Mountain View, CA 94043, 415/964-7023.

Speech Master
A board that combines phonetic synthesis and unlimited vocabulary with limited-vocabulary, high-quality speech. The product uses two chip types and is bus connected. An amplifier is included in the system. List price: $395. Tecmar, 23600 Mercantile Rd., Cleveland, OH 44122, 216/349-0600.

BASIC keyword, a letter of the alphabet, or a punctuation mark, enabling a computer to be programmed verbally. This capability is becoming available. Supersoft's *Voicedrive*, for example, enables the *Scratchpad* spreadsheet to be operated verbally. Each command, however, has to be entered by the user in training sessions before *Voicedrive* can be used. Each stretch of speech entered is linked to a single command in the *Scratchpad* command set.

What speech technology means for you is that you can make your computer speak right now. Talk to your personal computer, or have it talk to you and your friends. Speech technology will add a new dimension to your computing. Let your imagination run wild, and keep your ears open.

Henry Polard is a linguistics and speech consultant in the San Francisco Bay Area.

Supertalker II
A board that enables you to include spoken messages in your programs. It uses delta modulation storage and offers four sampling rates. *Supertalker II* requires 64K and one disk drive and includes 32K ROM. List price: $565. Mountain Computer Inc., 300 El Pueblo Rd., Scotts Valley, CA 95066, 408/438-6650.

Tecmar Voice Recognition
A board that has user-dependent voice recognition and a capacity of 100 words, expandable to 200. The system achieves 98 percent accuracy and allows the computer to respond to voice input. A microphone is required for system operation. List price: $995. Tecmar, 23600 Mercantile Rd., Cleveland, OH 44122, 216/349-0600

Voice-Alive
A board that stores up to 37 seconds of speech or 24 seconds of higher-quality speech. It can hold up to 16 messages of varying length. Messages are recorded by the manufacturer. List price: $1900. Data-Voice, 2 N. La Salle St. #1900, Chicago, IL 60620, 312/327-8488.

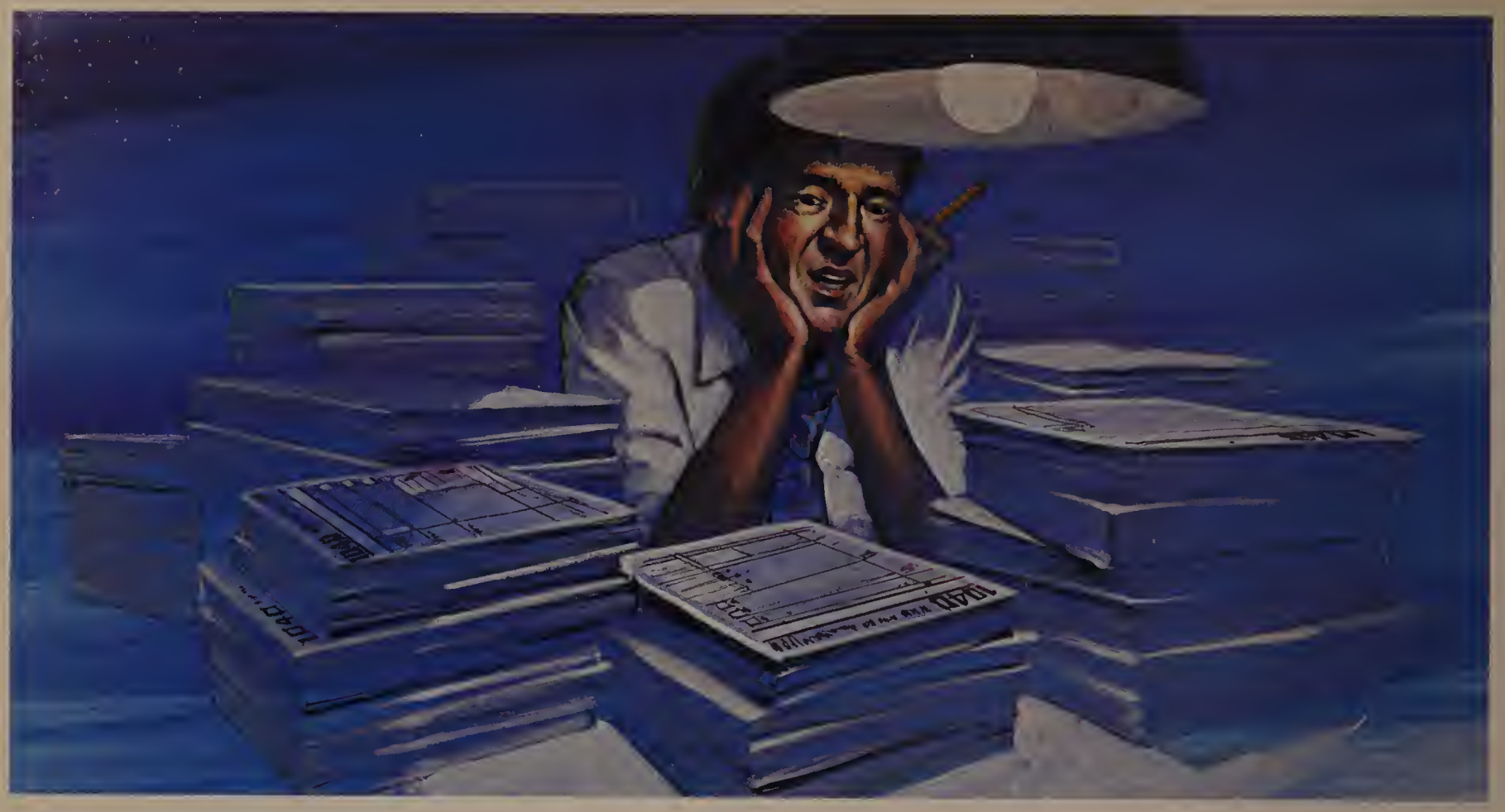
Voicedrive
A board that allows you to operate the *ScratchPad* spreadsheet program verbally. It requires 128K. List price: $495, $995 with a Tecmar Voice Recognition board. Supersoft, P.O. Box 1628, Champaign, IL 61820, 217/359-2112.

Votan V-8000
A system consisting of an IBM PC, speech software, and a speech development unit. It recognizes 255 utterances, and voice commands can trigger an additional library of words to be recognized. One training session is required per word. Voice response and voice store-and-forward capabilities are included. List price: $9000. Votan, 4487 Technology Dr., Fremont, CA 94538, 415/490-7600.

Votrax Personal Speech System
A phonetic synthesizer that has a 95 percent accurate text-to-speech algorithm. It has adjustable frequencies, amplitude levels, and inflections. The system can produce simultaneous speech and sound or music, and features eight user alarms and a 3500-character buffer. List price: $395. Votrax, 500 Stephenson Hwy., Troy MI 48084, 800/521-1350, 313/588-0341 in Michigan.

Votrax Type 'n Talk
A synthesizer with a text-to-speech algorithm that achieves 65 to 70 percent speech production accuracy and has phoneme access. It includes a 750-character input buffer. List price: $249. Votrax, 500 Stephenson Hwy., Troy, MI 48084, 800/521-1350, 313/588-0341 in Michigan.

Vynet 1000
A telephone-line interface that features programmable speech output. It answers phone calls and detects touch-tone signals. The product has a vocabulary of 300 words, and customized versions are available. List price: $295 for interactive interface, $1490 for voice module. Vynet Corporation, 2405 Qume Dr., San Jose, CA 95131, 408/370-0555.



Repeat it once more... "No manual tax preparation in '84"

Instead, save yourself time and money and satisfy your clients with your personal computer and... *MICRO-TAX**

Micro-Tax* can turn your personal computer into a profit center—you'll increase your client volume and take the drudgery out of tax preparation. And since the returns never leave your office, you have complete client security.

MICRO-TAX* IS COMPREHENSIVE. It offers three Federal tax packages and 23 fully integrated state packages, so you can select the programs that best meet your needs. Level II has a tax depreciation module, and it automatically computes underpayment penalties, self-employment taxes, minimum taxes, and income averaging. For those who prepare Federal partnership, corporate, and Subchapter S returns, Micro-Tax* has a Federal Level III package. Each tax season Micro-Tax* offers you an update package.

MICRO-TAX* IS VERSATILE. The program is compatible with your IBM PC* or XT*, DEC Rainbow*, Radio Shack*, or any other personal computer with CP/M*, PC DOS* or MS DOS*—from Apple* to Zenith*.

MICRO-TAX* IS FLEXIBLE. It's up to you; you can input the client tax information at the time of interview and produce the forms immediately, or enter data during the day and batch print returns at night. Micro-Tax* prints your returns on IRS forms, IRS approved substitute forms, or with transparent overlays.

MICRO-TAX* IS FRIENDLY. You can organize data entry in a sequence very similar to that of manual tax preparation, or you can compute forms out of sequence. It's up to you. *So go ahead, repeat it once more... "No manual tax preparation in '84." No need—once you've got Micro-Tax*. Call Micro-Tax* direct for complete details, or call your local dealer.*

Prove it to yourself: order a demonstration package—a complete 1982 Federal, Corporate/Partnership or State system for only $58.00 each.



FULL FEDERAL MICRO-TAX* PERSONAL COMPUTER SYSTEMS	1982 SCHEDULE AND FORMS INCLUDED																															PRINTS			
	1040, 1040A	1065, 1120, 1120S	A, B, C, E, ES	G, SE, W	D, F	K, K-1	R-RP	1116	2106	2119	2210	2440	2441	3468	3903	4137	4562	4625	4626	4684	4797	4835	4972	5695	6251	6252	ACRS	BATCH	Substitute	On IRS Forms	Blank Paper	Continuous Preprinted Forms
Level 2, Professional/ Individual Package	•		•	•	•		•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•				•
Level 3, Partnership/ Corporate Package		•				•	•								•			•			•						•	•	•	•	•				

• 23 Integrated State Returns Available • Orders taken for yearly update packages
• Forms subject to IRS changes for 1983 tax year

MICRO-TAX* MICROCOMPUTER TAXSYSTEMS, INC.
6203 Variel Avenue, Suite E Woodland Hills, CA 91367
Phone (213) 704-7800

*C/PM—trademark of Digital Research, Inc.; DEC Rainbow—trademark of Digital Equipment Corp.; MICRO-TAX—trademark of Microcomputer Taxsystems, Inc.; MS DOS—trademark of Microsoft Corp.; PC DOS, IBM PC, and IBM XT—trademarks of IBM, Apple—trademark of Apple Computers; Zenith—trademark of Heath Company and Zenith Radio Corp.; Radio Shack—trademark of Tandy Corp

Reader Service #293

When it comes to superior performance, we study our lines very carefully.

Superior printer performance is not a fluke. It evolves from analyzing printed line after printed line. Taking the time to test and retest. After 30 years of manufacturing precision parts, we know that there are no shortcuts.

And so we took the Gemini-10X and methodically put it through its 120 cps pace. We achieved a print head life of over 100 million characters with an extremely precise dot alignment creating each crisp character.

So far so good.

Next, sophisticated performance demanded versatility. A wide choice of character sets, a buffer expandable to 8K, and the ability to interface with all popular personal computers. We added macro instruction, giving Gemini-10X the capability to perform up to 16 operations with one command. We included as standard a paper feed system that has a friction and fully adjustable tractor feed. Then we even built in the dexterity to print graphics and text on the same line.

Done.

And, of course, staying the best means constant reviewing and fine-tuning. Keeping the Gemini easy to find, easy to afford and so reliable it can be warranted for up to twice as long as its major competitors.

Only the most careful engineering has built the new hard-working Gemini-10X. You'll applaud its performance.

star™ micronics • inc

THE POWER BEHIND THE PRINTED WORD.

Computer Peripherals Division
2803 N.W. 12th Street, Dallas/Ft. Worth Airport, TX 75261



Reader Service #319

NOW · YOUR · PERSONAL · COMPUTER CAN · BE · WORTH · ITS · WEIGHT · IN GOLD



Think it's about time your personal computer started earning its keep? Then you're going to enjoy our new **Chart Trader Plus™** package.

Now you can play the stock, commodity and options markets like a pro. And maybe make yourself a lot of money in the process!

Designed for your **Apple®** or **IBM PC®**, Chart Trader Plus places all the information you'll need to chart, analyze and predict price movements right at your fingertips.

COMPUTERIZED CHARTING MAKES ANALYSIS QUICK, EASY AND ACCURATE.

Thanks to Chart Trader Plus you won't have to spend hour after hour hand-drawing charts to see developing trends. Up to 240 days of market activity can be displayed on your screen in seconds.

Chart Trader Plus features a dynamic, full-color graphic charting system that enables any number of tracking studies to be superimposed on your chart at one time. And with your printer, a chart can be printed in *less than a minute.*

DATA FILE CREATION, MANAGEMENT AND UPDATING ARE AUTOMATIC.

Because it's in the most commonly used format, Chart Trader Plus' Data File Management Program places a virtual library of prices and statistics at your beck and call. You can easily create, update and maintain your files using the Data File program. And if you don't want to manually input data, telephone data acquisition is a breeze.

Plus, the package's unique AUTORUN* feature does all the work for you. With AUTORUN you can set a procedure, then go have dinner. By the time you get to dessert, your data will have been loaded, studies run and charts created and printed. All automatically!

CHART TRADER PLUS COSTS LESS.

At **$199.95**, Chart Trader Plus is a bargain. Competitive systems sell for as much as $2,000. But Chart Trader Plus is an add-as-you-grow package. There's no waste. You get just the functions you want . . . when you want them. You aren't forced to buy "extras" you may *never* use.

And once you master Chart Trader Plus, you can easily upgrade your analytic ability. Advance to one of our other software packages—you'll only pay the price difference.

LET YOUR PERSONAL COMPUTER PAY FOR ITSELF. AND THEN SOME.

Chart Trader Plus lets you take full advantage of your computer's money-making capabilities. With the investment analysis tools the pros use at your fingertips, success is within your reach.

To get the Chart Trader Plus, visit your nearest software dealer today. Or order direct from Omega MicroWare, Inc. by calling:

1-800-835-2246

OMEGA MICROWARE, INC.

222 SO. RIVERSIDE PLAZA CHICAGO, IL 60606
312-648-4844

*AUTORUN not available for IBM.

Apple Computer is a registered trademark of Apple Computer Inc.
IBM PC is a registered trademark of IBM Corporation.
Chart Trader Plus is a trademark of Omega MicroWare, Inc.
Software by Orion Management, Inc.

© Omega MicroWare, Inc.

Reader Service #379



Choosing the right tax shelter is more than a game of chance.

Choosing good investments will always be something of an art. But it shouldn't be a game of chance.

INTRODUCING THE STRATEGISTS. XQ Software introduces two new software programs that take some of the gamble out of your investment decisions; the Investment Strategist and the Tax Strategist. Designed for investors and investment advisors, they turn your IBM Personal Computer into a sophisticated tool for analyzing the tax and investment aspects of tax sheltered investments.

MAKING INFORMED INVESTMENT DECISIONS...THAT'S THE STRATEGY. These innovative programs tackle three tough questions:

How much tax shelter do you really need? The TAX STRATEGIST tells you how much shelter is right for your financial situation. It helps you plan strategies for reducing your tax liability.

Is this tax shelter a good investment? The INVESTMENT STRATEGIST helps you determine which tax shelters are good investments. You can compare tax shelters with each other and with other types of investments.

Does the tax shelter match your tax profile? The INVESTMENT STRATEGIST and the TAX STRATEGIST work together to help you find the shelters that match your personal needs. Now you can zero in on the best tax and investment approach.

THE COMPANY BEHIND THE SOFTWARE. XQ Software is an Intelligent Systems company. For over a decade Intelligent Systems has been an innovator in personal computer enhancements and color graphic peripherals.

The Tax Strategist and the Investment Strategist are available through authorized IBM Personal Computer dealers nationwide. Visit one and ask for a demonstration. It will one of the best investments you'll ever make.



THE INVESTMENT STRATEGIST™
$395

THE TAX STRATEGIST™
$395

(SOLD INDIVIDUALLY)

Reader Service #389

XQ™ SOFTWARE
An Intelligent Systems Company

4357 PARK DRIVE/NORCROSS, GA 30093
(404) 923-2880

FOR MORE INFORMATION MAIL THIS COUPON:

PLEASE SEND ME MORE INFORMATION:

- ☐ I'm an investor.
- ☐ I'm an investment advisor.
- ☐ I'm a computer dealer.

NAME _____
TITLE/POSITION _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____
PHONE ( ) _____

MAIL TO: XQ SOFTWARE, 4357 PARK DRIVE/NORCROSS, GA 30093

10/83 PCW



ne-stop communications. One-
tep installation. Smartmodem
200B and Smartcom II™ software
re available now.



Thanks to Smartcom II companion software, telecomputing is a breeze. You'll be creating files and sending data in no time.



Need important information from the main office today? Get it quickly efficiently, accurately. From their computer to yours.

Your computer's telephone.

HAYES™

Hayes is still leading the way with new telecomputing products. And now combining every bit of sophisticated technology into one communications package for your IBM* PC. Smartmodem 1200B and Smartcom II software. Everything you need. And more.

Whether you're receiving updates from the field, placing orders with suppliers a thousand miles away, or taking advantage of the diverse resources offered by networks and information services. Let Hayes provide the communications link. With our popular 1200 bps Smartmodem. Now available as a convenient plug-in board for the IBM PC. And packaged with our own communications software.

Smartmodem 1200B. Your computer's telephone. That's really what it is. A telephone that allows your computer to communicate over ordinary phone lines at up to 1200 bits per second. For speedy, economical transmission of data to any Bell 212A or Bell 103 type modem. And it's the one peripheral that vastly expands the usefulness of your computer.

Our single board Smartmodem 1200B can be installed by your computer dealer in minutes. It connects directly to your phone jack, operating with rotary dial, Touch-Tone** and key-set systems. Smartmodem 1200B will dial, answer and disconnect all of your calls automatically. It will even redial your last number upon command.

Smartmodem 1200B also features an automatic speed selector, that detects incoming transmission speeds. Along with screen displays to show you its current operating status. And, unlike some 1200 baud modems, Smartmodem 1200B operates at full or half duplex, for compatibility with most time-sharing systems.

For those who enjoy designing their own programs, Smartmodem 1200B is controllable using *any* programming language. But none of that is necessary. Thanks to Smartcom II. The communications program designed by Hayes, specifically for Smartmodem!

Smartcom II companion software. Maximizes Smartmodem's capabilities. Minimizes your effort. The first time out, you'll be creating messages, sending, printing and storing them to disk. Simultaneously.

And when you're on the receiving end, your IBM PC will do all the work, completely unattended!

But that's just part of Smartcom II's innovative story. For instance, before you communicate with another system,

Hayes®



A complete plug-in communications package for the IBM PC.

Requires an IBM PC with minimum 96K bytes of memory; IBM DOS 1.10 or 1.00; one disk drive; and 80-column display. No serial card or separate power source is needed.

Smartmodem 1200B.
(Includes telephone cable.)

Smartcom II
communications software.



you need to "set up" your computer to match the way the remote system transmits data. With Smartcom II, you do this only once. After that, parameters are stored in a directory on Smartcom II. Calling or answering a system listed in the directory requires just a few quick keystrokes.

You can store lengthy log-on sequences the same way. Press one key, and Smartcom II automatically connects you to a utility or information service.

And if you need it, there's always "help." One of several special functions assigned to your IBM function keys, this feature explains prompts, messages, etc. to make communicating even easier.

Smartcom II also provides a directory of the files stored on your disk. Letting you create, display, list, name, re-name or erase any file right from the screen.

Like all our products, Smartcom II and Smartmodem 1200B are backed by excellent documentation, a limited two-year warranty, and full support. From us to your dealer to you.

So, see your dealer today. Link up to the exciting world of telecomputing. With Hayes complete plug-in communications package for your IBM PC.

Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, Georgia 30092. 404/449-8791.

NOTE: The Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit.

In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

Reader Service #221

Smartcom II is a registered trademark of Hayes Microcomputer Products, Inc.
*IBM is a registered trademark of International Business Machines Corp.
**TM of American Telephone and Telegraph.
©1983 Hayes Microcomputer Products, Inc.
Sold only in the U.S.A.


PeachText
5000
PeachText
5000
Peachtree
Software

PeachText 5000™

In a word, a star is born.

PeachText 5000™ has arrived. A complete personal productivity system for word processing, financial modeling, mailing lists and simple data-base management. All at one price—$395.00. And all from Peachtree Software Incorporated.

The quality is unmistakably Peachtree: proven, powerful applications with menu-driven features, easy-to-use documentation and quick access to "Help" prompts. And they're fully interactive.

PeachText 5000 is available for the IBM Personal Computer,™ the COMPAQ Portable Computer,™ the Texas Instruments Professional Computer™ and the Zenith Z-100.

The PeachText 5000 Personal Productivity System includes:

1 Word processing

PeachText™ word processor. PeachText has long been recognized as one of the best in the industry, with sophisticated print capabilities second to none and complete editing capabilities for creating and manipulating a variety of documents. We've made it even better for PeachText 5000.

We've even installed the Random House Electronic Thesaurus™ in PeachText.

Spelling Proofreader. This high-performance package can check a 10,000-word document for spelling and typographical errors in less than two minutes.*

2 Financial planning

Turn your computer's memory into a worksheet for financial and other mathematical analysis. PeachCalc™ will address up to 256K of RAM, so you don't have to worry about your memory space outstripping PeachCalc's capacity. Combine spreadsheets with PeachCalc's merge functions or insert PeachCalc reports into PeachText documents. You can even use the "Execute" command to set up material from PeachText or other files to be fed into PeachCalc.

3 Data management

List Manager. This module uses Peachtree's state-of-the-art screen manager and index file manager to give you complete control over the design and use of mailing lists, labels and other files or reference aids. Output can be used with the PeachText word processor to individualize form letters or template documents.

Limited Time Introductory Offer

Now PeachText 5000 is available for $395.00. That's right—just $395.00.

And that's not all. With your PeachText 5000 package you will receive:

A free box of 10 Peachtree/Wabash 5¼" diskettes to hold the fruits of your new Peachtree productivity.

A coupon to get Peachtree's "Access Pak" for $10.00. The Access Pak, which has a retail value of $525.00, includes Information Access, which allows you to extract information from Peachtree accounting products for use with PeachText 5000 applications. And you get file converter programs to make existing WordStar,® Easy Writer™ and VisiCalc™ files usable with PeachText 5000—because you shouldn't have to suffer because you've waited this long for the complete personal productivity system.

Free 30-day support from Peachtree Software Incorporated, on return of the registration card.

PeachText 5000 is here. The *complete* personal productivity system. And it's unmistakably Peachtree.

*In actual trials using an IBM Personal Computer and 320K diskettes, Spelling Proofreader checked a 10,024-word document in one minute and 15 seconds, using the standard 20,000-word dictionary supplied with the package. Checking times may vary depending on your hardware.



WordStar is a trademark of MicroPro International Corporation.

Easy Writer is a trademark of Information Unlimited Software.

VisiCalc is a trademark of VisiCorp.

Random House Electronic Thesaurus is a trademark of Random House Inc.

Unmistakably Peachtree

Peachtree Software™

Who are the dealers in my area?

Name: _____

Company: _____ Telephone: _____

Address: _____

City: _____ State _____ Zip: _____

© 1983 Peachtree Software Incorporated an MSA company

3445 Peachtree Road, N.E. 8th Floor Atlanta, Georgia 30326 1-800-554-8900

PCW 78

Reader Service #286

Plug In a Processor

Sritek's MicroCards can take the place of the 8088 microprocessor and turn the PC into a far more powerful computer.

Steven Cook

There was much disappointment among computer aficionados when IBM announced that its Personal Computer would use the Intel 8088 microprocessor, for while the 8088 is a perfectly adequate device, it lacks pizzazz. Comparing the technical specifications of the 8088 to those of more advanced microprocessors is like comparing the handling characteristics of a Ford and a Ferrari.

> IBM has a long history of building Ford-like computers, machines that do a job without frills.

Of course, IBM's choice of the 8088 was a wise and not altogether unexpected decision. IBM has a long history of building Ford-like computers, machines that do a job without frills. Nevertheless, many industry pundits had secret hopes that the PC would blaze new trails in the lands of personal computing. Maybe next time.

One company, however, has not been content to wait. The company is Sritek, Inc. of Cleveland, and its product is the VersaCard, a 256K memory expansion card with a twist (see Figure 1). The VersaCard is designed as a foundation for a MicroCard (Figure 2), an optional circuit card that includes a microprocessor and other chips needed to connect it to the VersaCard. Sritek intends to provide MicroCards for all of the most technically sophisticated microprocessors.

When plugged into the PC, the MicroCard takes control, but that does not mean that the PC's 8088 will go to waste. Sritek has designed the VersaCard system to obtain maximum performance from the PC. Using a technique called co-processing, the PC's 8088 microprocessor is put to use controlling input and output operations between the MicroCard and peripherals such as the disk drives and printer while the MicroCard simultaneously performs other tasks.

The VersaCard is designed so that a system can be upgraded to use a new microprocessor by simply changing the MicroCard. An optional RAM Module (Figure 3) can be added to the VersaCard to raise the total memory on the board to 512K, and additional RAM can be added externally. This modular design means that keeping up with advances in computer technology will be easy and inexpensive.

Some MicroCards have additional co-processors for floating-point arithmetic, a time-consuming task that is best done by special math processing chips such as the Intel 8087. These cards give a PC blazing speed, the kind that attracts the attention of the Ferrari crowd.

But there is more. The VersaCard comes with software that increases the amount of information a PC can process in a given period of time. Called *FastCache*, the software stores blocks of disk data in memory so that they will be readily available for processing. Also available are an optional program to cache frequently used disk data such as the disk directory tracks, and a program to emulate a disk in memory.

A unique feature of the VersaCard is hardware that protects the memory used by *FastCache* and similar programs. Hardware protection ensures that data stored in memory cannot be accidentally destroyed by runaway programs.

68000 Features

One of the most popular high-performance microprocessors currently available is the Motorola 68000. The 68000 is a 32-bit microprocessor that

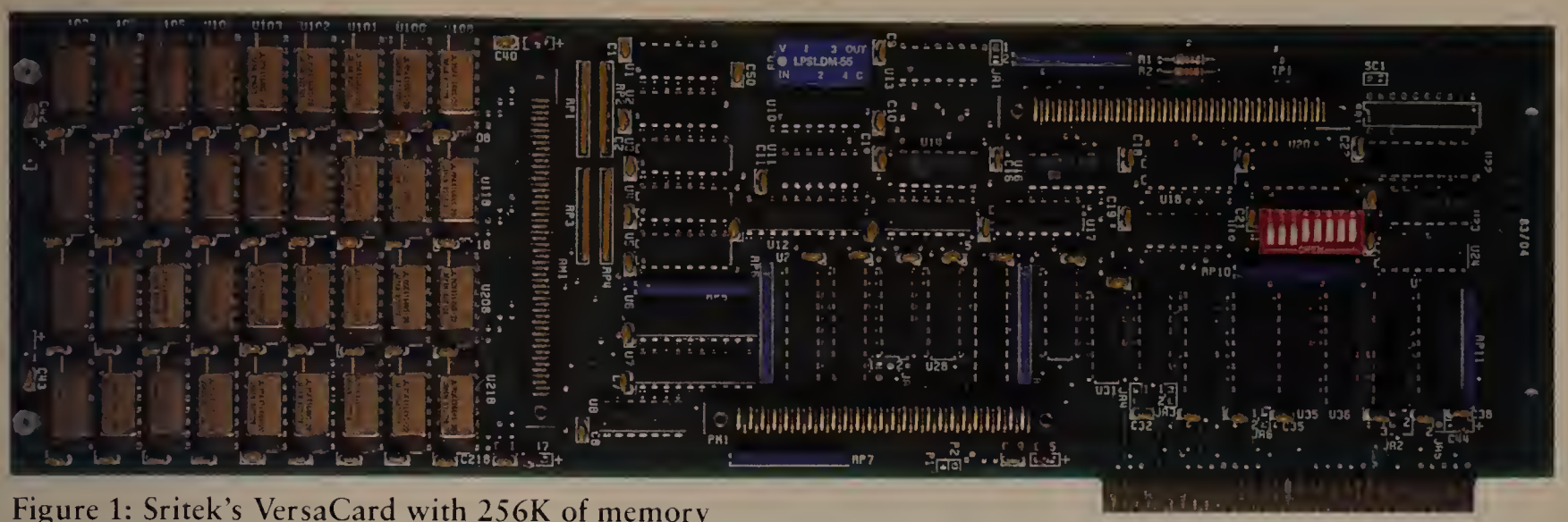


Figure 1: Sritek's VersaCard with 256K of memory

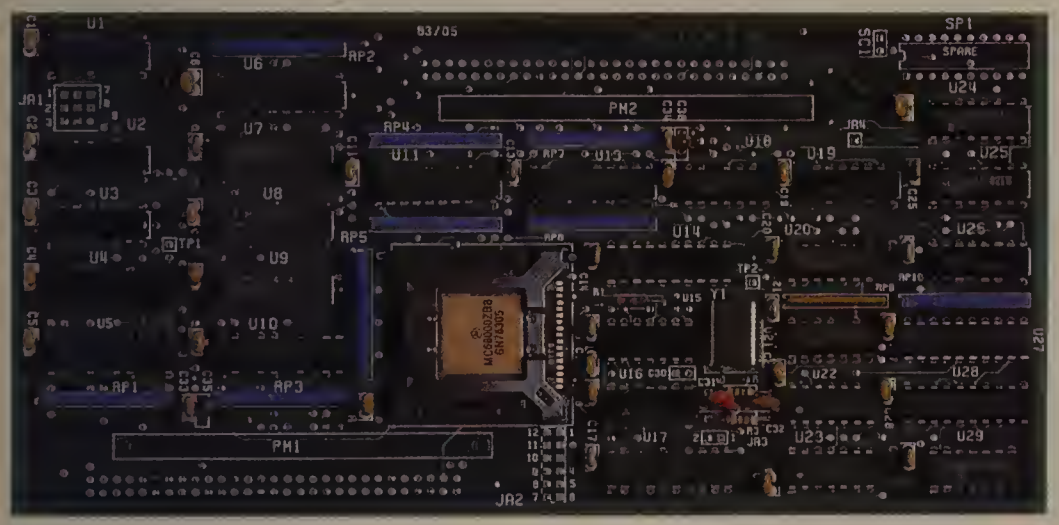


Figure 2: MicroCard for the Motorola 68000 microprocessor

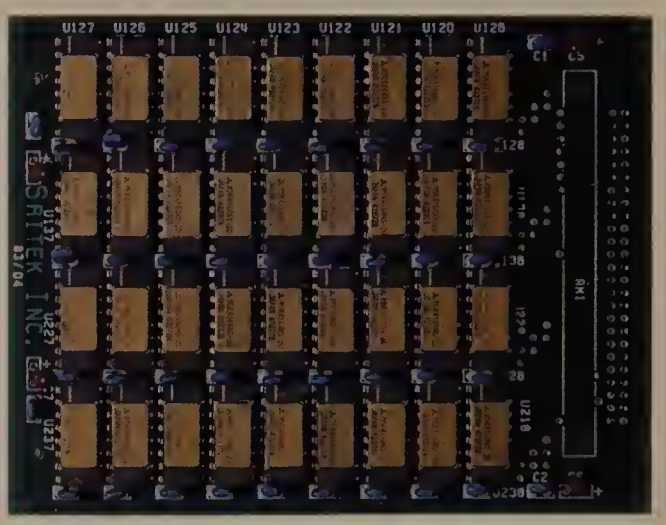


Figure 3: 256K RAM Module

uses a 16-bit data path to communicate with external devices such as memory. It can directly address up to 16 megabytes of memory, and Sritek's 68000 MicroCard has memory-management circuitry to allow it to support up to 16 users.

The 68000 MicroCard comes with the XENIX operating system. XENIX is Microsoft's version of UNIX, a powerful multiuser operating system created at Bell Labs that has gained much popularity in recent years. One feature of UNIX is its ability to support a "guest" operating system. Sritek has taken advantage of this and implemented MS-DOS as a guest, allowing an MS-DOS program to be executed on the 8088 while other programs are running under XENIX on the 68000.

The 68000 MicroCard is the first of several MicroCards that Sritek will be offering during the coming months. The other MicroCards announced by the company are for the Zilog Z-80, the Intel 8086, the Intel 80286, and the National Semiconductor 16032 microprocessors.

Popular Microprocessors

The Z-80 MicroCard provides a link to the past for users who would like to use older, Z-80 software in conjunction with the high-quality hardware and wide variety of options designed for the PC. In a step typical of Sritek's approach to technology, software is included with the card to emulate the CP/M operating system under MS-DOS. This means that CP/M itself is not needed in the system, and all disk files are stored in standard MS-DOS format. Of course, programs and data must first be transferred from a CP/M computer onto PC disks; Sritek provides software to facilitate this process. Once transferred, data can be exchanged freely between CP/M and MS-DOS programs, eliminating the nuisance of separate disks and cumbersome conversion procedures.

The Intel 8086 microprocessor is almost identical to the 8088 microprocessor used in the PC, except that the 8086 uses a 16-bit data path—twice as large as the 8-bit path used by the 8088—to communicate with memory and other external devices. A 16-bit path means the 8086 performs external device operations about twice as rapidly as the 8088. Sritek's 8086 MicroCard operates at a clock speed of 8 megahertz (MHz), more than 60 percent faster than the PC's 4.77 MHz clock. The result is a

processor that can use all the software written for the PC but executes that software three or four times faster. And since this processor requires no special programming, it can be put to use immediately.

Faster and Better

The capabilities of the 80286 microprocessor are truly amazing. As described by James Fawcette in "Mighty Chips" (*PCW*, Vol. 1, No. 5), the 80286 is software compatible with the 8086 and 8088 and provides the kind of computer power needed for multiuser systems. According to Sritek, the 80286 performs tasks approximately six times faster than an 8086, and like the Motorola 68000, it can address 16 megabytes of memory. Comparisons performed by David A. Patterson of the University of California at Berkeley show that in some situations the 80286 can outperform a large mainframe computer by a ratio of 2 to 1.

Microsoft has contributed to the future success of this microprocessor by announcing XENIX-286, a multiuser operating system that will allow the 80286 to be used immediately in a wide range of applications.

The combination of the 16032 microprocessor and Berkeley UNIX forms what is probably the most powerful computer system ever to sit on top of a desk.

One use envisioned for the 80286 is as the node processor for a local area network, accepting data from small groups of terminals called clusters and forwarding it in large packets to the network's central controller. Distributing tasks in this manner is the most efficient way to implement a network, but until recently the cost of such computer power has prevented its widespread use. These networks will become more popular as products such as the 80286 MicroCard make the technology more readily available.

Mainframe Capabilities

The National Semiconductor 16032 is perhaps the most powerful microprocessor currently available. The 16032 MicroCard has built-in logic to perform a sophisticated operation called demand-paged virtual memory management, a technique to ensure that frequently used data remains easily accessible to the microprocessor. Demand-paged virtual memory management is a feature of such powerful computers as Digital Equipment Corporation's VAX-11 series and IBM's System 370. Its application to personal computers is yet another step in a long series of technological advances that have continually provided more computer power at lower prices.

To support all of the 16032's computer power, Sritek offers Berkeley UNIX version 4.1, a robust and proven operating system that is the result of over a decade of work at the University of California's Berkeley campus. The combination of the 16032 microprocessor and Berkeley UNIX forms what is probably the most powerful computer system ever to sit on top of a desk, at a total cost of about $6000. The ratio of price to performance in this system paves the way for the PC to be used in applications that in the past were not feasible, such as computer-aided engineering. The VersaCard system makes this technology readily available, which creates a snowball effect of more applications developing as the technology becomes even more widespread. In this way Sritek is playing an important role in advancing the state of the art of personal computing.



Figure 4: 68000 microprocessor in leadless package

The products described in this article clearly indicate Sritek's commitment to technology, and further examination reveals that Sritek is also dedicated to quality. All of its products are built using military-quality components—the best available—and Sritek claims that less than 1 product in 10,000 fails to pass final inspection. Some of the cards contain 12 layers of printed circuitry, a level of engineering uncommon in microcomputer products. Although expensive, this technique allows a higher number of components to be mounted on a printed circuit card, because the wires that connect the various components can be printed on the inner layers of the card.

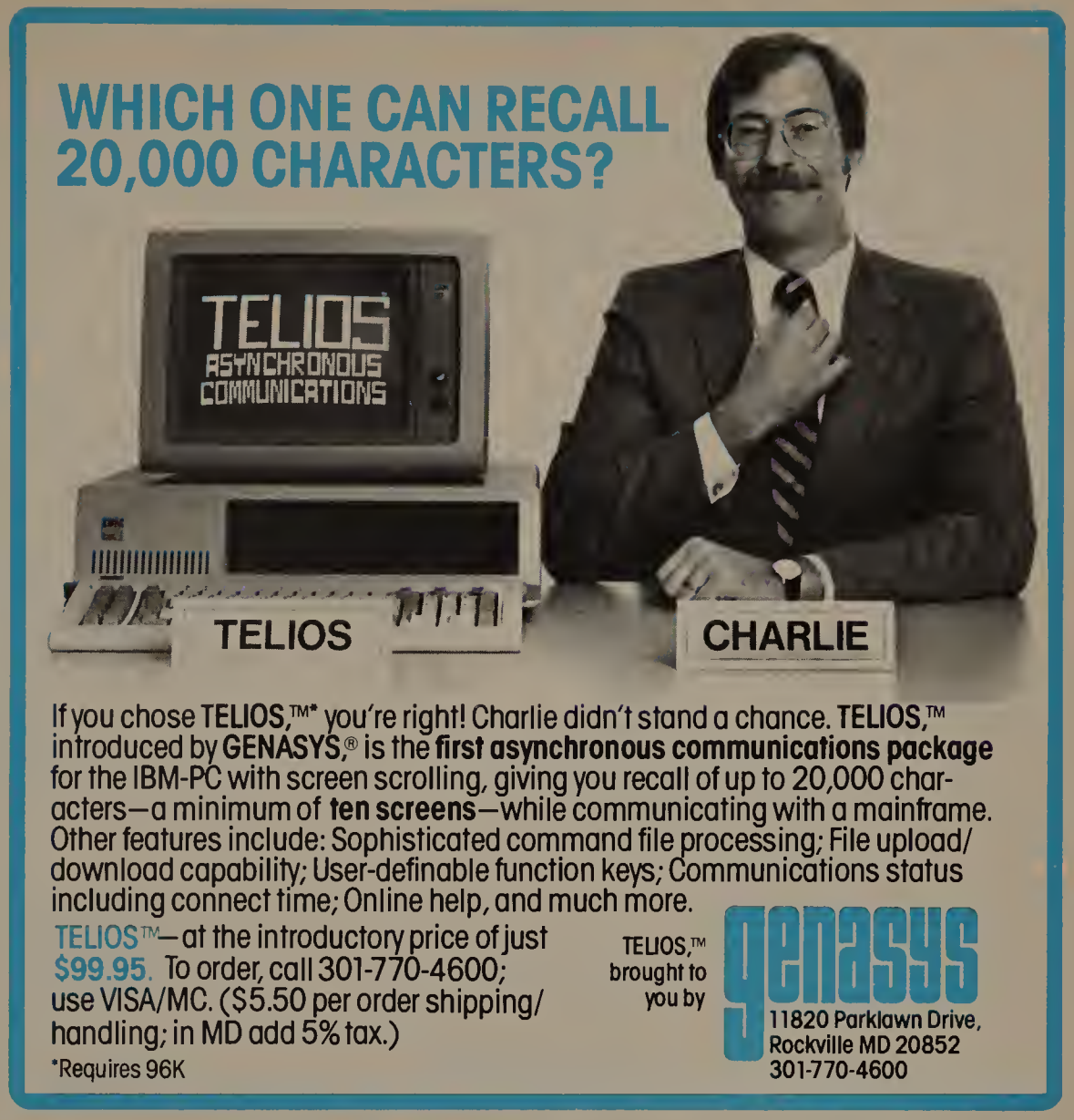
So many components are included on some of the MicroCards that special integrated circuits must be used to fit everything onto one card. Most normal integrated circuits are mounted in rectangular packages that have a row of metal pins extending

from the long sides, but Sritek employs one of the newest developments in printed circuit technology: the leadless package (Figure 4). Leadless packages are square, and they have contacts, not pins, extending from all four sides. The leadless packages are mounted in sockets, rather than soldered to the card. The socket, though more expensive, allows the microprocessor itself to be replaced easily. With faster versions of these microprocessors already being developed, this is an important feature.

For PC owners, the Sritek products provide a path for future expansion and a way to protect their investments in hardware as technology advances and their need for computing power grows. The multiuser capabilities of the MicroCards allow several users to access the facilities of a personal computer and to share a data base for substantially less than the cost of separate PCs for each user.

But Sritek's largest customers will be companies that supply turnkey systems, computers already configured with the hardware and software needed to perform a specific task. The result of this technological partnership will be increasingly powerful systems available for a wide variety of specialized applications—Ferrari computing for the Ford computer crowd.

VersaCard
MicroCard
RAM Module
Sritek, Inc.
10230 Brecksville Rd.
Cleveland, OH 44141
216/526-9433
List Price: VersaCard $995, MicroCard $195 to $995, RAM Module $595



Reader Service #306



Reader Service #360

THE CORONA PC's™ ARE HERE.



The Corona PC's, desktop and portable, give you everything you've ever wanted in an IBM-compatible PC and more. For a great deal less.

Compatible and more.

The Corona PC is a 16-bit microcomputer based on the 8088 microprocessor, just like the IBM PC. And like the IBM PC, it runs any software that conforms to the IBM standard.

But unlike the IBM PC, the Corona PC comes with 128K of memory. Supports up to 512K on the main board. Includes a 320K floppy drive, a communication port, a printer port and an improved IBM PC keyboard.

Both the desktop and portable Corona PC's include high-resolution monitors and built-in graphics. Higher character definition makes both models easier to read, and our 640 x 325 pixel high-resolution graphics are over 60% better than the IBM PC. It's a complete system, the standard for microcomputing in the IBM-compatible world.

You can take it with you.

And unlike IBM, we have a portable version.

Its high-resolution, high-contrast 9" display is easy to read. It has all the power and features of our desktop, but lets you take it to the office next door, across the country or just conveniently tuck it onto a corner of your desk.

More expandability.

You may never add a thing to your Corona PC because we've built in so much capability.

But just in case, we've built all the important components into the main system board, leaving the four expansion slots free. And provided an extra large power supply to support any capabilities you may want to add in the future.



RAM-disk for incredible speed.

Our RAM-disk software lets you treat an area of your computer's memory as if it were a disk drive. So you can copy your programs and data into memory, then watch your work get done faster.

More software.

The Corona PC includes the MS-DOS operating system and comes with GW-BASIC, the MultiMate[1] word processor and the PC Tutor[2] training course. So you can start being productive immediately.

And you can run Context MBA[3], dBASE II[4], LogiCalc[5] and LogiQuest[5], the EasyFamily[6], Wordstar[7] and the "Star" family, the SuperWare[8] series, T.I.M.[9], the VisiSeries[10] and Perfect Series[11] of programs and most other popular software.

And it improves your bottom line.

The Corona Portable PC™ is $2,545, the desktop version is $2,595. Both about a thousand dollars less than the equivalent IBM PC.

For more information, contact Corona Data Systems, 31324 Via Colinas, Westlake Village, CA 91361. (213) 991-1144. Call (800) 621-6746 toll-free.

Or better yet, just grab your hat and head to the nearest Corona PC dealer for a very convincing demonstration.

corona
The Compatible Company

© Corona Data Systems 1983 1: TM Softword Systems. 2: TM Comprehensive Software Support. 3: TM Context Management Systems. 4: TM Ashton-Tate. 5: TM Software Products International. 6: TM Information Unlimited Software. 7: TM Micropro. 8: TM Sorcim Corp. 9: TM Innovative Software. 10: TM Visicorp. 11: TM Perfect Software Inc.

Reader Service #48



Every Executive Needs an Organizer Like T.I.M.®

Your valuable business information needs to be organized. T.I.M. can do it easily and quickly on your IBM-PC. As the executive's data base management system, T.I.M. makes it easy for you to assemble all your information so it can be ordered, changed or retrieved and then printed to suit a variety of circumstances. From phone lists through complex sales reports, T.I.M. helps you put it all together using plain English commands — no programmerese to confuse you. Plus T.I.M. interfaces with all of the most popular word processing systems as well as powerful tools like Visicalc® ... T.I.M. is the executive's solution that's simple to use, easy to learn and pays off in bottom line efficiency for you and your organization. For more information see your local IBM-PC dealer or contact Innovative Software for the name of the T.I.M. dealer nearest you.

Innovative Software® developers of practical businessware for the executive.

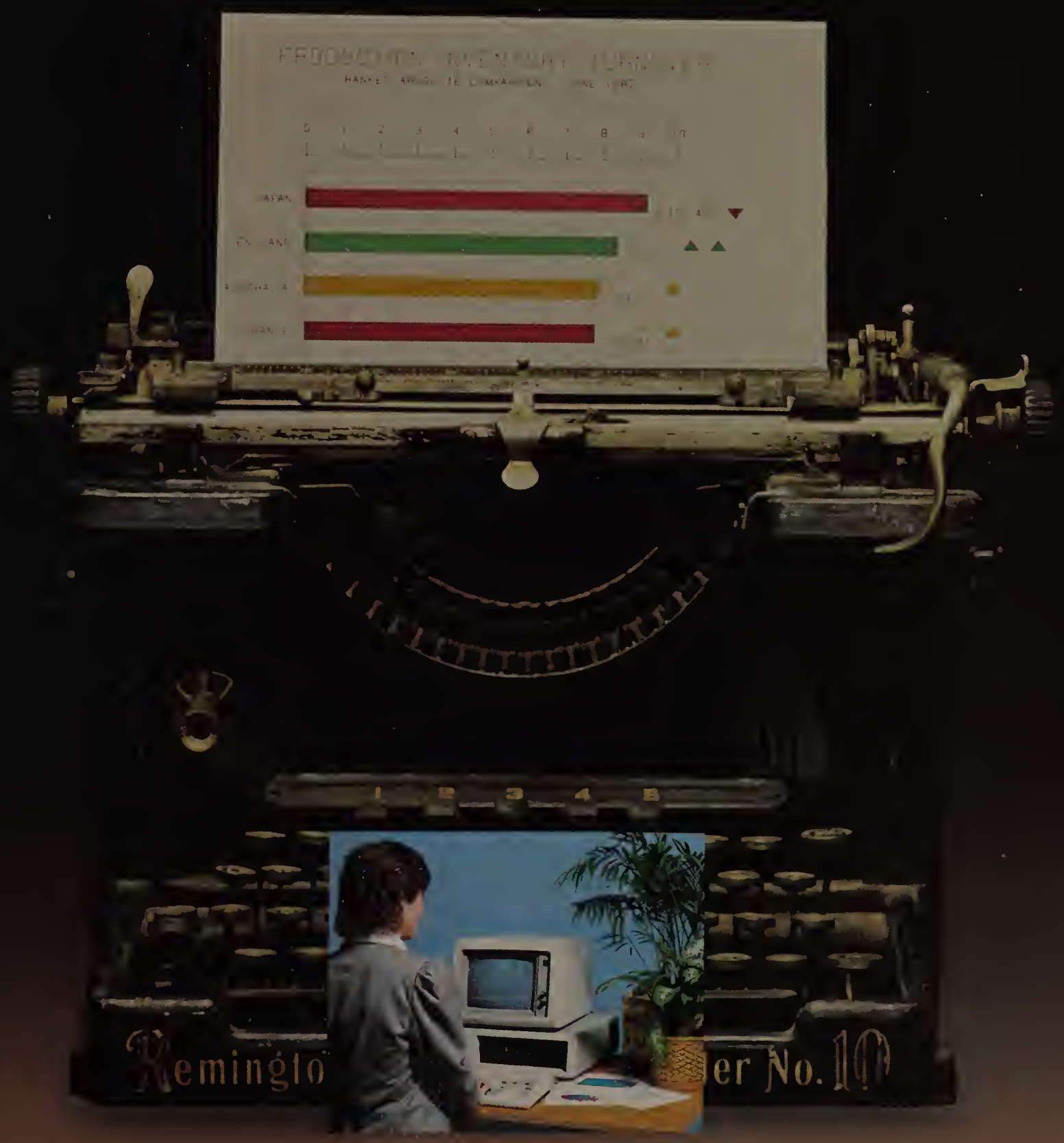
Reader Service #225

T.I.M. III is sold at Computerland® , Sears Business Centers, The Xerox Stores, Computer Marts, Entre' Computer Centers℠, CompuShops® and other independent dealers.

9300 W. 110th St., Suite 380 • Overland Park, KS 66210 USA • 913/383-1089 • Telex: 209542

"What Is Now Proved Was Once Only Imagined."

William Blake



The **Graphic Decision Support System, GDSS,** is a business graphics package created for decision making. To meet this objective GDSS® offers:

Internal Database Facility Data can be entered manually or retrieved from a remote computer via terminal emulation and host data utilities. By offering access to vast quantities of information, selecting from that pool, and displaying the selection as graphic images, GDSS enables decision makers to identify trends, spot spikes, make comparisons among related and unrelated objects and perform mathematical functions on the results.

Software Interfaces GDSS interfaces easily with spreadsheet packages and existing mainframe applications. An effective vehicle for moving host-quality graphics to the PC environment.

Easy To Use Chart Building Tools Multiple user levels begin with a simple menu structure for the non-computer trained and advance through commands and command files to the development of customized menu structures. GDSS provides over twenty different formats (i.e. line, bar, 3-D bar, pie, bubble, text, report, etc.) and even enables users to define their own formats.

Graphic Editing The powerful graphic editing facility is an effective tool for creating or enhancing graphs of arbitrary complexity using the digitizing tablet.

Environment GDSS will run in a variety of configurations. The following is the minimal configuration required for the IBM PC: ■ 320K random access memory ■ two double-sided, double density 5.25 inch floppy disk drives ■ two RS 232 ports ■ IBM PC color monitor board and a color monitor (Amdek, IBM, etc.). For higher resolution, use an intelligent graphics screen (AED, Chromatics, Ramtek, and Tektronix supported). ■ optional digitizing tablet

No other business graphics package offers all the features of GDSS.

Our demo diskette and user manual are available for your review at **$35.00**

This amount will be applied to your purchase of GDSS. Call or write:

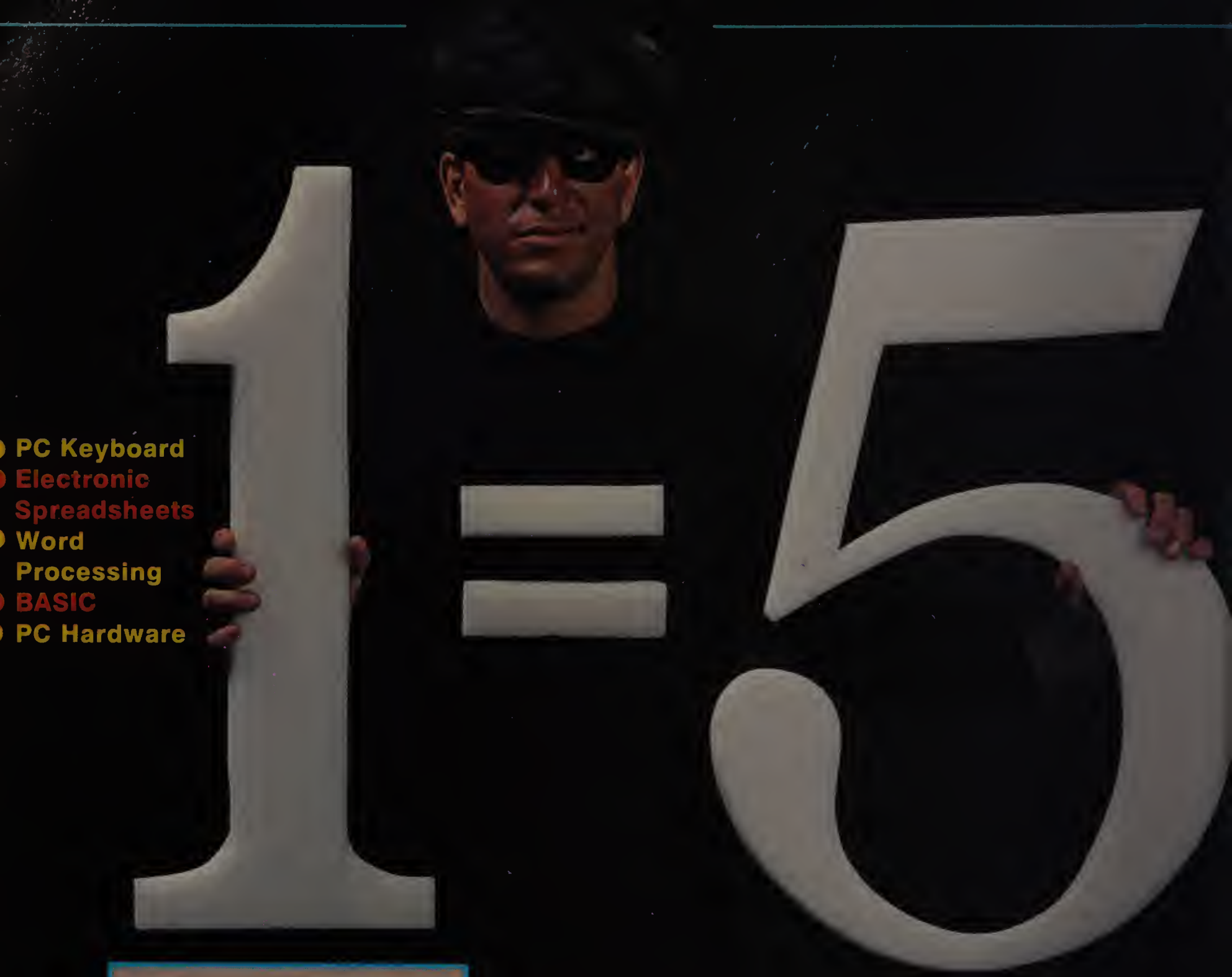
DBV

Data Business Vision, Inc.

3510 Dunhill, Suite B, San Diego, CA 92121

619/450-1557

Reader Service #378



- PC Keyboard
- Electronic Spreadsheets
- Word Processing
- BASIC
- PC Hardware



PC PAL EQUALS FIVE PROGRAMS IN ONE

When I'm working, running around all over town and carrying extra weight is risky. PC PAL makes my work easier because it's 5 programs in 1. PC PAL teaches me about the PC keyboard and electronic spreadsheets. And also about word processing, BASIC, and the PC hardware. 5 programs in 1 makes learning easy, fast . . . and inexpensive.

PC PAL requires 64KB, a double-sided diskette drive, an 80-character display and MS-DOS.

Suggested retail $39.95.

See your PC dealer. Dealer inquiries welcome.

Comprehensive Software Support
2316 Artesia Blvd, Suite B
Redondo Beach, CA 90278
213/318-2561

Reader Service #35

High Performance IBM PC-to-Host Coax-Connection

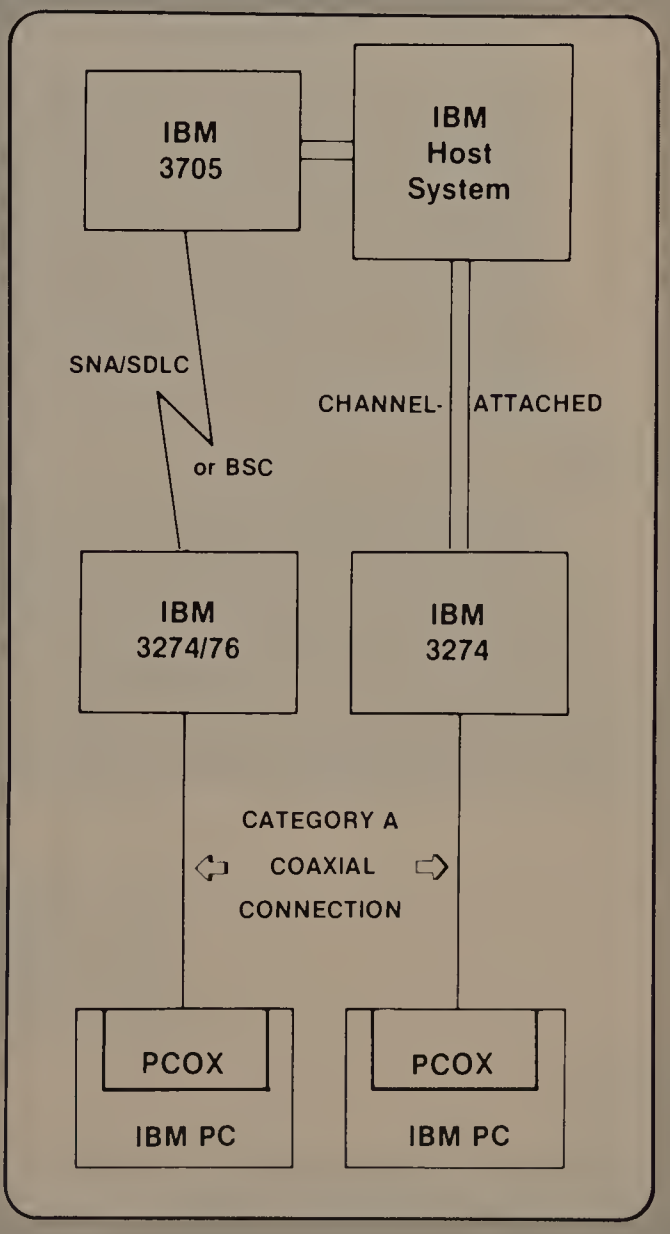
WITH THE PCOX™ INTERFACE

SUPERIOR PRICE/PERFORMANCE
PCOX provides an extremely efficient, cost effective means to access full-screen host applications from the IBM PC. PCOX provides high performance, high speed access through the IBM PC DMA.

COAX INTERFACE PROVIDES EXACT 3278/79 EMULATION
The PCOX package integrates both hardware and software and is easily attached via coaxial cable to your controller. PCOX hardware creates exact emulation for models 3278/2-3-4 and 3279/2A-3A.

FILE TRANSFER CAPABILITY
The software includes a file transfer utility, providing for menu-selected file transfers between the IBM PC and the host computer system.

INTELLIGENT WORK STATION
By connecting your IBM PC to the host with PCOX, the PC can be used as a fully functional, intelligent work station providing the user with more distributed computing power than ever before available.



PCOX™ efficiently integrates the IBM PC into host networks without any host systems or applications software changes regardless of the operating system or access method

cxi
An affiliate of Systems Network Analysis, Inc.
10011 N. Foothill Blvd. · Cupertino, CA 95014 · 408/725-1881

Reader Service #397



Bright.

The IBM PC. It's one of the smartest investments you've ever made. Chances are, it's changed the way you perform hundreds of tasks in your business. And now you're ready to explore more ways to expand its functions.

That's bright thinking. The kind that makes you and your company look good. Now here's an idea that will make you look brilliant. Literally.

Introducing The SCION PC640 Professional Color™ Display System.

With 4096 brilliant colors to choose from and the sharpest professional resolution at 640 × 480, SCION has raised the science of business graphics to a fine art.

For graphing, plotting, charting, drawing an infinite variety of images, or even creating images for color slides, our PC640 is indispensable. For graphics that fully communicate your ideas, it's unsurpassed.

Quite simply, the PC640 is far superior to any other IBM PC color add-on for both cost-effectiveness and performance. And while our PC640 board is easily installed, our software



Brilliant.

is even easier to follow. Our standard HALO* package allows programmers to create limitless displays. And with our Cheetah** Fast Track package, even non-programmers can create complex graphics in minutes.

Best of all, with its multitude of capabilities, the PC640 will substantially reduce what you spend for graphics preparation. In many cases, it will more than pay for itself in a single business presentation.

To us, that makes getting the PC640 better than brilliant. That makes it just plain smart.



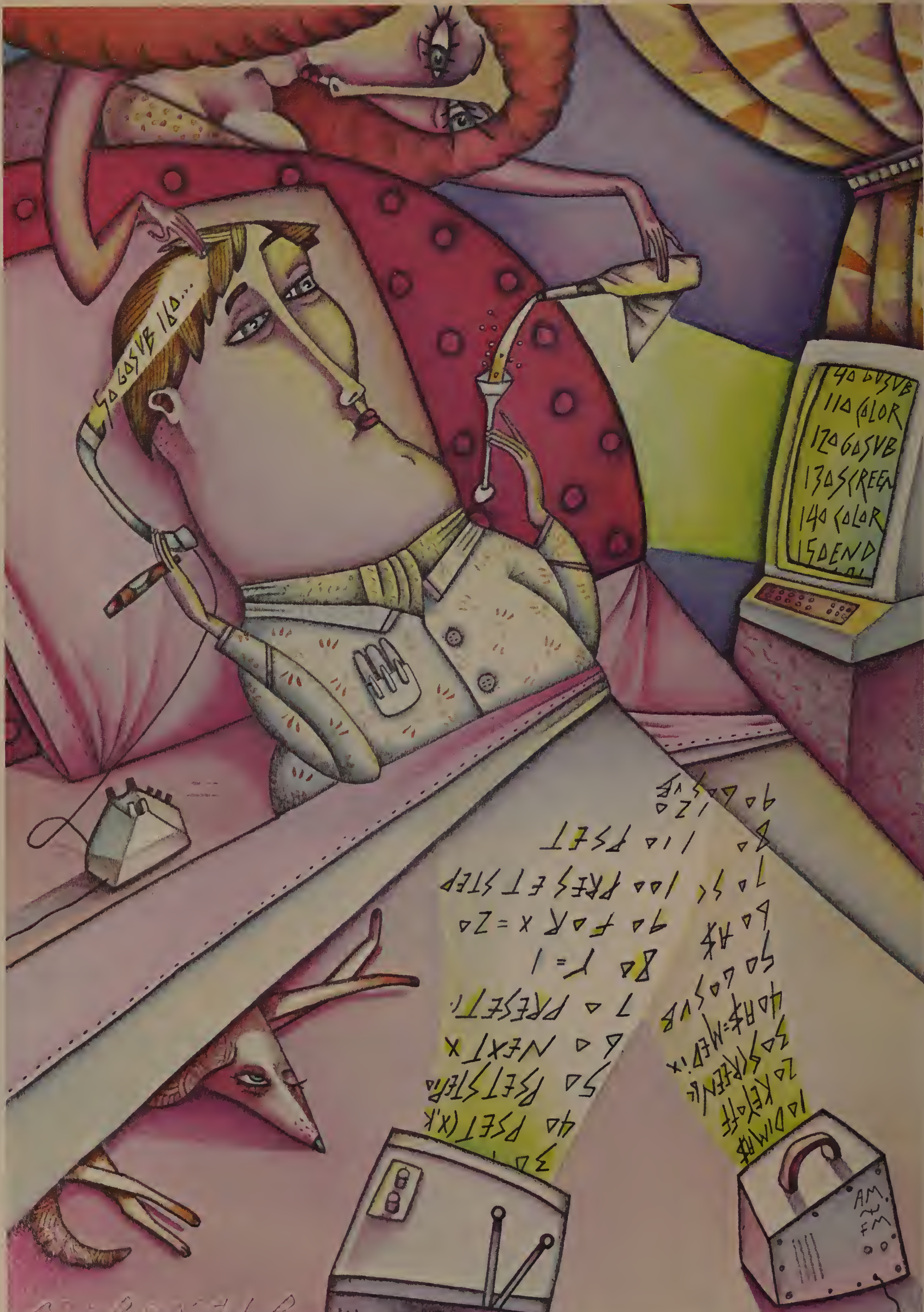
The PC640 Professional Color™ board delivers superior resolution at 640 × 480, and the simultaneous use of 16 out of 4096 colors.

For more information about all the ways a PC640 makes sense for your business, please contact Harry Freer at (703) 476-6100 or TWX: 710-833-0684. Or write: SCION Corporation, 12310 Pinecrest Road, Reston, Virginia 22091.

SCION

**HALO is a trademark of Media Cybernetics, Inc. **Cheetah is a registered trademark of CENTEC Corporation.*

Reader Service #167



50 GOSUB 160...
110 COLOR
120 GOSUB
130 SCREEN
140 COLOR
150 END
AM FM

Special Delivery Software

With teledistribution you may never have to leave your computer to buy software again.

Lisa B. Stahr

At one time the only way to get a computer program was either to buy it bound in a plastic sandwich bag at a computer show or to write it yourself. Since then software has unzipped the Zip-Lock on its plastic prison and proliferated shamelessly in an unsuspecting world. To many computer users, today's plethora of programs personalizes personal computing; to others it offers a multitude of program choices when only one is desired. Whether users like it or not, having so many program choices means infinite computing possibilities.

In 1986 computer users are expected to reach a $4 billion software-buying frenzy, market researchers say. Today software creators and sellers, in a frenzy themselves at the thought of such sales, are looking for ways to make their products more widely available to these future buyers.

Mail order houses already sell about half the software that personal computer users buy today. These houses are so successful that some retail store owners who can't stock as many programs as mail order houses refuse to sell computer magazines that run mail order advertisements.

In the race to provide the most software choices to the most end users, mail order houses, because of their low prices, are in a strong position. But other factors must be considered, including service and support.

Software-only stores, based on the same concept as record stores, keep a large stock of programs for a variety of personal computers. Unlike mail order houses, however, software-only stores provide their customers with a "try before you buy" service. Before purchasing a program, users can try it out on any of the store's many demonstration computers. What's more, software-only stores offer buyers a place to return to if they have problems with the program, an extra that mail order houses can't offer.

Each sales channel has its own advantages; mail order houses save the user money, while software-only stores offer prepurchase demonstrations. But while these two battle it out for software sales supremacy, a unique method of selling software is gaining popularity. The method is teledistribution of software, which in the coming age of communications could become a formidable contender in the software sales campaign. If the idea catches on, computer users may never visit another software store or write to another mail order house again.

A handful of teledistribution, or teledelivery, companies are already downloading software right into users' computers using cable broadcasts, FM subchannels, and telephone lines. To these users teledistribution is the most convenient, efficient, and inexpensive software sales channel around.

> 'Cable companies are fragmented, so the audience coverage isn't universal like it is with telephone lines.'

Telephone Software Connection, Inc. (TSC) in Torrance, California, has been delivering programs over the phone to Apple II users for four years. With this two-way communication, a customer calls TSC anytime, day or night, via modem. The answering TSC computer sends the caller a greeting that appears on his

or her computer screen. If the caller already has an account with TSC, he supplies his name and password. If the caller is new to TSC's services, he receives an explanation of the system, and his credit information is collected.

Once the caller's credit is determined or the password verified, a catalog of available programs, including free demonstration versions, is displayed. To purchase a program the caller selects the item from a list, and the TSC computer transmits the software to the caller's computer, which saves the new program to disk. Once the transaction is complete and the caller disconnects, the TSC computer records the call to a system log and generates a credit card transaction. The caller is not charged for initiation or connection time, but only for the program purchased.

Telephone Transmissions

TSC uses leased telephone lines for transmission, according to President Ed Magnin, "because they go everywhere." With phone lines, Magnin says, TSC can also run a cyclic redundancy check that indicates problems, backs up, and makes corrections during transmission. "After every 256 characters, which is about every 8 seconds, 2 more characters are sent to do the check," Magnin explains. The frequency of the check makes it easy to catch and correct any errors that may occur.

TSC, which has downloaded Apple software to Saudi Arabia, Venezuela, Hong Kong, Australia, and Europe, is going to tackle the IBM PC in the near future. "The techniques we've developed for transmitting to the Apple will work with the PC," Magnin says, "and we've got a stable of software for the Apple that could be easily converted." To enter the PC market Magnin will work with PC experts to write TSC's communications software for the Hayes Smartmodem, the Ventel board, and other IBM PC modems.

Games

Although only a few companies such as TSC are teledistributing applications software over phone lines, other companies may soon increase the competition. Control Video Corp. (CVC) of McLean, Virginia, has opened a teledistribution service called GameLine. An Atari VCS 2600 owner can buy a CVC receiver, called a Master Module, for $59.95 at a local video game retail store, plug it into the Atari's cartridge slot, and enter his personal identification number. Once the system accepts the ID number, a command screen appears with game numbers on it (such as Frogger-05). Once a player selects a game number, the Master Module, which has brought the preceding screens up from its memory, automatically dials CVC. The game is downloaded in 20 seconds via the 2000 baud modem inside the Master Module. The player is charged for each game played, and because most of CVC's customers are kids, each player has a weekly credit limit to keep the game time in check.

William von Meister, who founded CVC after starting The Source with Jack Taub, entered the games market because of the "12 to 15 million video game systems out there." Already von Meister's company has sold more than 250,000 Master Modules. "But a Master Module can be made to plug into a PC just as easily as into the Atari VCS," von Meister adds. In fact, a CVC Master Module for all personal computers will be announced at the January 1984 Consumer Electronics Show.

Similar to CVC, Source Telecomputing Corp., also in McLean, offers a teledistribution service called Texnet. Up to now the service has been available to Texas Instruments 99-4A owners, although it will open up to other users within the next year. Texnet, which is free to users except for hourly connect charges to The Source, enables users to upload or download user-programmed and contributed software to or from their TI computers. "Teledelivery is a very popular area," says The Source's manager of public relations, Nancy Beckman. Texnet, introduced about 18 months ago, has 1000 users out of 35,000 Source subscribers.

Not to be outdone by the competition, CompuServe of Columbus, Ohio, The Source's electronic network rival, is also teledistributing software to its subscribers. "We have an area on CompuServe called The Software Exchange that allows our customers to purchase software from us and to download it into their computers over the telephone lines," says Editorial Director Richard Baker. "We have over 100 programs on The Software Exchange," including educational, word processing, and financial programs. Like other teledistribution channels, purchases are billed to subscribers' credit card accounts. The Software Exchange, which has been in operation for three years, offers programs ranging in price from under $10 to $1000.

> Teledistributing software to retailers may keep them from floundering.

On Your FM Dial

Of all methods of downloading software, ordinary telephone lines are the most popular. Yet another McLean firm, INC Telecommunications, finds leasing telephone lines too cost-prohibitive for teledistribution. "Dis-

tributing software to 1000 people, for example, means making 1000 phone calls," explains Stephen Dull, product manager for INC. "With FM transmission you send it all in one fell swoop."

INC Telecommunications, founded by Jack Taub of The Source, is the result of a joint venture between National Information Utilities (NIU) and National Public Radio (NPR), the largest public radio station in the United States. "NPR has a sophisticated satellite network, while NIU has the technology that enables it to send digital information over FM subcarriers to users' computers," Dull says. These subcarriers are used for analog transmissions such as Muzak (often heard in elevators and dentists' offices) and foreign language radio broadcasts. "NPR's satellite is used for the long haul," Dull adds, "and then an FM subcarrier for the last mile."

The primary focus of INC's activity is now electronic mail and electronic messaging. Dull expects to have these services in operation in the Washington, D.C. area by late 1983 and across the nation by the end of 1984. He adds, "We'll work with the software distribution aspect [of teledistribution] all along but probably not get into it as a commercial operation until the end of 1984."

At that time INC will be the carrier for the information and a division of NIU will supply the software. "The division will contract with INC—just as any other company can—to supply the software we'll send," Dull explains. INC has already been approached by several large computer manufacturers interested in teledistributing their software.

From the user's side, INC subscribers will be given a special receiver for their computers. The software transmission, sent via satellite and FM subcarrier, will be addressed to go to a particular location (that is, to INC receivers). Subscribers' computers must be ready to accept the data at the time of transmission, which could take as little as 100 seconds for a 32K program. To take care of



Reader Service #101

Wear It With Pride!

Computer Jewelry from MC/N, Inc. signifies professional involvement in the microcomputer industry. Our unique designer pieces are the perfect solution for gifts, awards, incentives, or premiums.

As lapel pins, tie tacks, or stick pins, they are available in sterling silver or 18K gold·over·sterling.

Be identified as a micro professional!

Order now by completing the coupon, or contact MC/N, Inc. Satisfaction is guaranteed, or your money back.

Actual size ½" square

MC/N, Inc.
COMPUTER JEWELRY
Simms Center/Box 9393
San Rafael, CA 94912
415/453-7033

☐ Dealer Inquiry
☐ Send info re: Corporate Volume Discounts
☐ Send info re: Custom 14K or 18K Gold—with or without Diamonds or Rubies

Please send the following pieces of computer jewelry:

	Gold- $12. ea.	Silver- $10. ea.	Amount
Lapel Pin	____	____	$____
Tie Tack	____	____	____
Stick Pin	____	____	____
Sub Total			$____
Shipping & Handling			2.00
CA residents add 6% sales tax			____
TOTAL AMOUNT ENCLOSED			$____

NAME/CO. _____
ADDRESS: _____
CITY: _____
STATE/ZIP: _____
TELEPHONE: _____
Visa ____ MasterCard ____ Expiration Date _____
Credit Card Number InterBank # _____
Signature _____

Reader Service #101 Allow 2-3 Weeks for Delivery

garbled data, which could render the transmitted program useless, Dull says that the home receivers will be "smart" so that they can make corrections when errors occur. Errors also can be checked at the INC transmitter; errors where long strings of bits are lost will be uncorrectable, but Dull thinks that those incidents will be as rare as getting a bad disk.

Data Broadcasting

Downloading software via FM subcarriers is not the only one-way communications method available; in Toronto, Canada, TCP Business Systems is using cable broadcasts to send electronic messages and download software to personal computers. "This will probably be one of the better ways to distribute software in the future," predicts Murray Desnoyer, president of the new company. Desnoyer predicts that once the computer industry moves into large-scale integrated circuit design, the cost of a board that plugs into the PC to receive the video signal will drop to about $400 or $500.

Although TCP is now involved primarily in electronic messaging, its data broadcasting service uses a television signal to deliver software also. Desnoyer envisions teledistribution customers setting up their home video cassette recorders (VCRs) to record the video signal when it is sent, probably during the off hours of midnight to 6 a.m., and then loading it back into their computers from the VCRs when they're ready to use it. The programs they receive, however, will be encrypted so that only part of the program is available to demonstrate what the package can do.

"The user will need to call up a local clearinghouse to have the program billed to his credit card account," Desnoyer explains. Once billed, customers are given a series of numbers to type into their computers to unlock the remainder of the software. Although the technology is available to do this downloading today, the cost is too high to stir much user interest.

The Drawbacks

One-way teledistribution, whether via FM subcarriers or data broadcasts, may be cheaper for mass transmissions than telephone lines, but opponents claim that the service is fraught with problems. Vendors "never can check if the software's been received," complains von Meister of CVC. INC's Dull says, "But I don't see that as a problem, because customers will contact you if the transmission is garbled and then you can resend it."

And for cable companies, TSC's Ed Magnin offers a dismal prognosis as well: "Cable companies are fragmented in areas and some serve different socioeconomic classes, so the audience coverage isn't universal like it is with telephone lines." In addition, Magnin points out that one-way subscribers will be frustrated by having to set up their computers for the exact time of the FM transmission or cable broadcasts.

Another problem FM transmission opponents cite is software piracy. According to Dull, however, piracy is not as much a worry as his rivals think. "Data would be difficult to pirate because it's encoded. You'd need INC's special receiver, which has a demodulator inside it, to decode the data." Using a personal computer to decode the data would also be impossible, Dull says, because the 9600 bits per second transmission rate is too fast for those machines.

The Long Arm of the Law

While Dull may be able to defend the use of one-way transmissions, his company and other one-way broadcasters may eventually have to defend themselves in court as well.

In August 1971 a United States patent covering the concept of distributing computer programming via one-way broadcast communications was issued to Washington University in St. Louis, Missouri. As Dull points out, the patent is "pretty broad," yet the institution is being contacted for licensing agreements by companies interested in developing one-way broadcast communications for computer programs. INC hasn't had any problems with the patent yet, according to Dull, nor has TCP, which is under the jurisdiction of the patent even though it's in Canada.

Software Vending Machines

While those involved in teledistributing software argue the relative merits of each method, the program authors, sellers, and users may be asking whether the idea of teledistribution is a good one. Software retailers, who have a lot to lose if teledistribution catches on, are understandably against the entire concept; teledistribution companies are split on what to do about the retailers they may replace.

According to Magnin at TSC, retailers are already "losing ground fast." He suggests that they might get back into the game with a software vending machine connected to a teledistribution system. "A customer without a modem could go to the dealer, view a selection list of available programs, and even get a demonstration on the software vending machine," Magnin explains. "When the customer is ready to make a purchase, the dealer could initiate the sale with a special card or key or whatever." One drawback to the vending machine concept, Magnin admits, is that it would be expensive to implement.

Von Meister agrees that teledistributing software to retailers may keep them from floundering under the new teledistribution system. "You could limit the programs companies send to just games and sample programs," von Meister suggests. "You just can't put the retailers out of business."

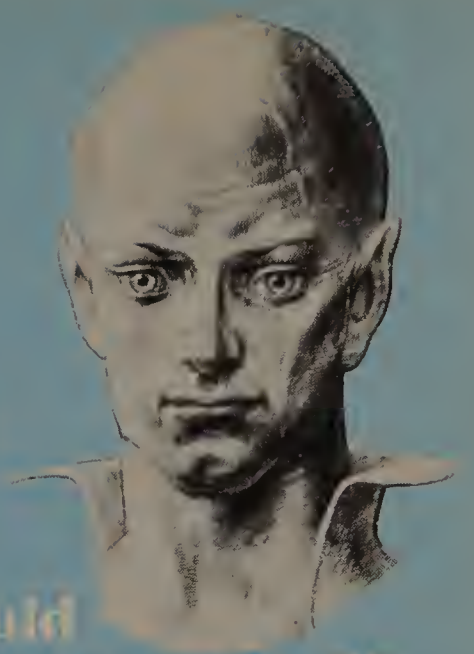
To some teledistribution proponents, however, eliminating the retailer means cutting out the middleman. "There's a direct relationship between the customer and the software house with teledistribution," says Magnin. "If there is a bug in the program, then the customer can go directly to the supplier with the problem." Also, by checking the serial number on the package the software teledistributor knows if the person with the complaint actually bought the program or just copied it, Magnin explains.

Expanding the Options

Magnin eagerly points out the many other advantages of teledistribution, including sending users the most recent version of a program plus free updates if the program has flaws, and being able to lower product cost per unit. At TSC, for example, programs average between $25 and $30 each, with the most expensive package listing at $75.

Magnin adds that teledistribution means greater program differentiation too: "We have around 45 programs available now." CVC's von Meister concurs; "Teledistribution means that the little guys can get anything published—they don't have to get into ComputerLand to get something sold." The result, he says, is a market that will flourish. "Multi-time users will find teledistribution just what they need," adds Stephen Dull of INC. "Unit costs will be less for them, although those who buy only one or two programs a year probably won't have a need for the service."

Greater communications capabilities offer computer users access to more information more quickly. Teledistribution of software, a perfect example of communications convenience, offers users a choice of what software to buy and where to buy it without ever leaving their computer consoles. But after all, expanding options is what personal computing is all about.



C86™

"Why on Earth would you want any other compiler?"

C86 - For Professional Programmers

Complete C Tight Code No Royalties Library Source

- **C - The Language for Professional Programmers:** C combines full control of the machine with the best productivity features. C is used by:
  IBM Bell VisiCorp Digital Research MicroPro Wang Microsoft
- **A Complete Implementation** - C86 includes all of the features described by Kernigan and Ritchie. C86 delivers portability, consistency, FULL C.
- **Extensions** include long identifiers and additional data types.
- **Tight code is produced** by C86. Only needed code is linked from the library. The January 1983 Byte benchmark shows C86 as the fastest.
- **No Royalties** are payable to us on C programs you sell.
- **Library Source** provided includes UNIX I/O support, interface with and control of the Operating System and of hardware, all functions described in K & R, a Mathematics Library, and a Trigonometry Library.
- **Overlay Support** allows development of large programs.
- **Assembler** may be used to write a function. **Macro support** can increase productivity. Programs are **ROMable.**
- **Our Update Policy** helps you to keep the **Best Personal Computer C Compiler** for the 8086 as the technology improves.

See your Dealer for:

☐ Free Information: "C86 Product Description" ..... NC
☐ "The C Programming Language" by K & R .....$ 25.00
☐ "The C86 User Manual" 35.00
☐ C86 Compiler Diskette and Manual 395.00

We support **all common formats** under PC-DOS, CPM-86, MSDOS and MPM-86.

VISA and Master Card accepted. They Say It All... We Do It ALL

Computer Innovations
10 Mechanic Street
Suite J-122
Redbank, NJ 07701
201-530-0995



C86 is a trademark of Computer Innovations, Inc. CPM-86 and MPM-86 are trademarks of Digital Research. MSDOS is a trademark of Microsoft. PCDOS is a trademark of International Business Machines.

Prices subject to change without notice.

Reader Service #406

ComNet™ FROM TECMAR

NETWORKING
- Ethernet
- Electronic mail
- Device sharing
- No dedicated server required
- Operates with no floppy-based system
- Remote job execution
- File lock out
- Password protection
- Server back-up available

TELEPHONE SUPPORT
(available through modem board)
- Autodial - with extended telephone numbers
- Auto Redial
- Call Forwarding
- Length Of Call Indicator
- Directory Support - with unlimited number storage
- Message Support - either leave or obtain messages. Receive messages remotely
- This unit (with a handset) substitutes for a telephone

MODEM
- Gateway to networks
- Electronic mail
- Device sharing
- Remote job execution
- File lock out
- Password protection
- 300 to 1200 baud modems available
- Data in network can be obtained by decoding touch-tone sequence or through voice recognition prompt
- Respond to remote terminal
- Access dictating systems on network. Control them by touch-tone decoding
- Programs or calculator can be used remotely. The touch-tone keypad can be used to provide numeric input to programs or the calculator from a remote site (programs are loaded by decoding touch-tone sequences).

VOICE
- Voice mail
- Voice annotated text
- Voice messages

VOICE RECOGNITION
- Transparent keyboard. Speak instead of type
- Give commands over phone

ComNet

ComNet is designed to meet your total communication needs including computer to computer (networking), person-to-computer and person-to-person communication requirements for data and voice.

The network protocol employed is the industry standard high speed Ethernet which permits a number of IBM PC's to be linked together by ordinary thin coaxial cable. In addition to its own computer's power, a user has the availability of other devices which are also attached to the cable - such as various printers, plotters, large disks, etc.

All versions of ComNet include an Ethernet interface and conversion of voice into data and back again. This enables one to give and recieve spoken messages from any location, as well as storing the message for later transcription. The SECRETARY is the basic system with these features.

SECRETARY $1695[1]
- Ethernet Link
- Ethernet Companion
- ComNet Software



EXECUTIVE $2995[1]
- Ethernet Link
- Ethernet Companion
- Modem (300 Baud)[2]
- Voice Recognition
- Microphone
- ComNet Software

[1]With **1st MATE**, **2nd MATE**, or **3rd MATE** in Station

[2]Option: 1200 Baud Modem

Reader Service #190

IMPROVE PRODUCTIVITY THROUGH TOTAL COMMUNICATIONS SUPPORT

DICTATING SYSTEM

- Control the Pearlcorder X-02 or XR dictating system at local or remote stations through keyboard or foot pedal control or by telephone touch-tone decoding. Allows you to dictate to the "ComNet" system from any place in the world.

FOOT PEDAL SUPPORT

- Controls dictating system
- Controls response to voice recognition

SOFTWARE

- Time Management - alerts you to appointments at any station you are logged onto.
- Message Management - either electronic mail or voice.
- Clock/Calendar - either visual or audible
- Calculator - either visual or audible
- Voice Management - oversees voice mail, voice message and voice annotated text operations

These software packages can be operated through voice recognition (even over telephone) with voice output, through the telephone keypad with voice output or through the IBM PC keyboard

The MANAGER system adds a modem which can turn the PC into a telephone if a separate handset is added. The modem enables the MANAGER to receive unattended voice and data from any telephone in the world. The MANAGER can key in commands thru the decoding of the tones in the telephone keypad.

The EXECUTIVE is the most complete implementation of ComNet, adding computer recognition of spoken commands. An executive might phone the PC to leave or retrieve messages or request specific information. The PC, in a spoken voice, can request the user's access code (or respond to questions regarding which of several options is desired). The EXECUTIVE has the option of keying in answers or commands with the phone's tone dialing buttons, or simply speaking the answer or commands.



MANAGER $1995[1]

- Ethernet Link
- Ethernet Companion
- Modem (300 Baud)[2]
- ComNet Software

HARDWARE

ETHERNET LINK **$950**
Permits communications between computers at extremely high speeds (10 Mbits per second). The transmission mode is through single video coaxial cable with easy-to-use BNC connectors.

ETHERNET COMPANION **$695**
Performs the function of voice digitization and voice replay, dictation machine control and foot pedal control. Also contains interface for mouse.

MODEM
103 (300 Baud) **$295**
212A (1200 Baud) **$695**

- 103 (300 Baud) or 212A (300 or 1200 Baud)
- Pulse/tone automatic dialer
- Dual tone DTMF receiver (decodes touch tones)
- Auxiliary voice circuit
- Auxiliary, optically coupled, ring indicator output (capable of being used for auto power-on)
- Can replace telephone with the addition of a handset

VOICE RECOGNITION **$995**
MICROPHONE **$170**
User-dependent 100 word recognition (200 words optional) with 98% accuracy. Permits computer to respond to voice input.

MORE TO COME...
ComNet FROM TECMAR

TECMAR
6225 Cochran Road
Cleveland, Ohio 44139
Phone: 216-349-0600/Telex: 466692



You can count on 3M diskettes. Day after day.

Just like the sun, you can rely on 3M diskettes every day. At 3M, reliability is built into every diskette. We've been in the computer media business for over 30 years. And we've never settled in. We're constantly improving and perfecting our product line, from computer tape and data cartridges to floppy disks.

3M diskettes are made at 3M. That way, we have complete control over the entire manufacturing process. And you can have complete confidence in the reliability of every 3M diskette you buy.

Look in the Yellow Pages under Computer Supplies and Parts for the 3M distributor nearest you. In Canada, write 3M Canada, Inc., London, Ontario. If it's worth remembering, it's worth 3M diskettes.



3M hears you...

3M

Reader Service #310

WordPerfect



A word processor should be an extension of your mind.

A good word processor should feel comfortable, and let you put your thoughts down quickly, almost effortlessly. It should have automatic everything, and include footnotes, merge, columns and math. The screen should be uncluttered and give you an honest view of your text without annoying codes. WordPerfect does all this and has proven itself at places like Harvard, RCA, State Farm, and Texaco. The software is well documented, is guaranteed, and is available for immediate delivery.

vailable on Data General, IBM PC,
ictor 9000 and Zenith Z-100 —
ith others to be announced soon.

SSI

SATELLITE SOFTWARE INTERNATIONAL
288 WEST CENTER
OREM, UTAH 84057

(801) 224-8554 (800) 321-5908
TELEX 453-188

IBM and Corvus. The perfect match.

Joining IBM and Corvus together matches the first name in computers with the world's leading supplier of mass storage and local networks for personal computers. Together, they bring you the ultimate in powerful business tools.

With a Corvus Winchester disk, you can now pair off your IBM Personal Computer with 6 to 80 million bytes of mass storage. And with our standard-setting local networking system—Corvus Omninet™—you can connect up to 63 personal computers, and even couple IBM with other brands. That means you can share the capabilities—and costs—of mass storage, printers and other peripherals.

So for a micro marriage made in heaven, look to Corvus. We'll put you in touch with the performance your IBM Personal Computer was originally meant to offer.

For full details, contact your Corvus dealer today.

CORVUS SYSTEMS

2029 O'Toole Avenue, San Jose, CA 95131
408/946-7700 TWX: 910-338-0226
Reader Service #49



"Radio Shack's TRS-80® Model 100 is an amazing machine."

—*Byte Magazine*, Page 34, May 1983

"When I consider the unheard-of abilities contained in this small, under $1000 package, I must rate the Model 100's performance "excellent."
—*InfoWorld*, June 27, 1983

"It is the first portable computer we've seen that's both practical and affordable."
—*Popular Computing*, May 1983

"It can do all of the things that one of the new integrated systems on much larger machines can do."
—*Computers & Electronics*, May 1983



The Computer That's Taking America by Storm is Radio Shack's $799 Micro Executive Workstation™

More and more people are finding it easy to make friends with our TRS-80 Model 100 portable computer. Maybe it's things like a full-size keyboard, a built-in modem and an 8-line by 40-character display. Or is it? *Byte* magazine said, "On top of the impressive collection of hardware that makes up the Model 100 is an equally impressive collection of software." Indeed, the TRS-80 Model 100 is the *only* computer with five built-in programs. Use it as a personal word processor, address book, appointment calendar, telephone auto-dialer and communications terminal.

And *Basic Computing* says Model 100's BASIC language "... gives perhaps the most accurate transcendental mathematical functions in any computer." In its May, 1983 issue, *Money* magazine said "... the Model 100 is so packed with goodies that it could well become the machine of the year. Just the fact that someone who knows absolutely nothing about computers can sit down ... and in less than 10 minutes be writing letters on it puts it in a class all its own." Read enough? Then get your own TRS-80 Model 100 at your nearest Radio Shack Computer Center or participating store or dealer!

Radio Shack®

The biggest name in little computers®

A DIVISION OF TANDY CORPORATION

☐ **Send me a free TRS-80 Model 100 brochure.** 84A831

Mail to: Radio Shack, Dept. 84-A-805
300 One Tandy Center, Fort Worth, Texas 76102

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____

Prices apply at participating Radio Shack stores and dealers

Reprinted with permission from: Basic Computing, May 1983, pp. 41-42, 80-Northwest Publishing, Inc., Byte Magazine, May, 1983 pp. 14-34, Computers & Electronics, May 1983 pp. 51-55, Ziff-Davis Publishing Company; InfoWorld, June 27, 1983, pp. 66-69, Copyright 1983 by Popular Computing/Inc., a subsidiary of CW Communications, Inc., Money, May 1983, pp. 154-158, Time, Inc., Popular Computing, May 1983, pp. 86-165.

Reader Service #361

EASIBOARD™

THE EASIEST™

1985 technology in 1983. It took longer than expected for our Research and Development Department to meet its challenge: create the most advanced multifunction board for the IBM PC – ahead of present day technology, and more advanced than the original multifunction boards introduced with last year's technology. And above all, make it simple and make it easy. The result: Easiboard by Easitech.™

Nine distinct functions in just one IBM PC or XT slot. After surveying business executives and other personal computer users, we discovered that nine computer functions were most desired. We merged them all together, and made Easiboard as simple as plugging in your tv at home.

Memory, Spooler, Printer and Modem Connections, Three Electronic Disks, Chronograph and More. Easiboard gives your IBM PC or XT more memory (up to 256K), three high-speed solid state electronic disk emulators, a printer connection, a communications port for modems or additional printers, a buffer-spooler so you can compute and print at the same time (part of the Easiboard memory becomes a memory for your printer), a battery-backed real time chronograph (an extremely accurate clock-calendar), and the ability to switch between two printers when both are connected to one PC. All on just one simple plug-in board.

IBM quality plus Easitech Excellence exclusively at IBM PC dealers worldwide. Easiboard is only available at authorized IBM PC dealers. You'll find Easiboard at the same place you find the IBM PC – quality retail stores you can depend on to carry only the best microcomputers and enhancements.

Easy to find the best price, too. Try $325 for Easitech Excellence and a two year guarantee. No need to search through dozens of magazines for low prices. Our lowest prices are at IBM PC dealers. Not anywhere else. And we back our product with a two year guarantee. If your IBM PC dealer does not carry Easitech products, ask him to call us at (404) 923-3186.

SPECIFICATIONS
EASIBOARD WITH EASIMASTER™ SOFTWARE

- Socketed for 64K to 256K of Random Access Memory.
- Three high-speed solid state electronic disk emulators, each many times faster than normal disk drives.
- Centronics-compatible parallel port for printers or other parallel devices.
- Serial RS232 async communications port for modems, printers or other serial devices.
- Extremely accurate chronograph (computerized clock/calendar in real time with Nicad battery back-up).
- Buffer/spooler which allows use of the computer while printing is underway, eliminating the usual waiting.
- Easiswap™, a feature which allows switching from one printer to another, as when both a dot matrix and a letter quality printer are connected to the same IBM PC. Or use it for switching communications devices.
- Ultra high-speed Motorola RAM chips, the gold ones.
- 100% IBM PC and XT compatible.

Easiboard with 9 functions. $325 (socketed for 256K). **$395** (64K installed, socketed for 256K). **$595** (256K installed).

IBM PC DEALERS

ALASKA • Computerland, Anchorage, Fairbanks. Microage Computer Store, Anchorage. • **ALABAMA** • Computerland, Anniston, Birmingham, Mobile. Anderson Computers, Inc., Florence. Huntsville. Olensky Brothers Computers, Mobile. • **ARKANSAS** • Computerland, Fayetteville, Fort Smith, Jonesboro, Little Rock. • **ARIZONA** • Computerland, Mesa, Phoenix, Tucson, Data Place Computer Stores, Inc., Phoenix Tempe, Photo & Sound Company, Phoenix. • **CALIFORNIA** • Computerland, Anaheim, Bakersfield, Belmont, Burlingame, Capitola, Carlsbad, Concord, Dublin, El Cerrito, Fairfield, Fremont, Fresno, Glendale, Hayward, Laguna Hills, Lawndale, Long Beach, Los Altos, Los Angeles, Monterey, Newhall, Newport Beach, Novato, Oakland, Pasadena, Redding, Sacramento, San Bernardino, San Diego, San Francisco, San Gabriel, San Jose, San Leandro, San Rafael, Santa Barbara, Santa Clara, Santa Maria, Santa Rosa, Stockton, Thousand Oaks, Torrance, Tustin, Ventura, Visalia, Walnut Creek, West Covina, West Los Angeles, Woodland Hills, Computer City, Brea, Orange, San Diego, Santa Ana, Gateway Computer Center, Cerritos, Huntington Beach, Photo & Sound Company, Costa Mesa, El Monte, Fresno, Sacramento, San Diego, San Francisco, San Jose, Exectec, Los Gatos, Napa, Computer Ware, Inc., Modesto, Macys Computer Solutions, Palo Alto, San Francisco, San Mateo, Microage Computer Store, Pleasant Hill, Santa Ana, Businessland, Inc., San Jose, Rac Computers, Inc., San Jose, Computer Plaza, Santa Barbara. • **COLORADO** • Computerland, Arvada, Boulder, Colorado Springs, Denver, Englewood, Fort Collins, Grand Junction, Greeley, Lakewood, Compushop Inc., Aurora. • **CONNECTICUT** • Computerland, Danbury, East Hartford, Fairfield, Hamden, Stamford, W Hartford, Microage Computer Store, Danbury, Greenwich, Computerease, East Hartford, Milford, Entre' Computer Center, Glastonbury, Orange, Computerworks, Westport. • **D.C.** • Computerland, Washington, The Math Box, Inc., Washington, • **DELAWARE** • Computerland, Newark, Wilmington. • **FLORIDA** • Computerland, Altamonte Springs, Boca Raton, Clearwater, Coral Gables, Fort Myers, Ft Lauderdale, Jacksonville, Lakeland, North Miami Beach, Orlando, Sarasota, Seminole, Tallahassee, Tampa, West Palm Beach, Entre' Computer Center, Altamonte Springs, ICS, Coral Gables, The Computer Factory, Inc., Miami, **GEORGIA** • Computerland, Athens, Atlanta, Compushop, • Computerland, Athens, Atlanta, Compushop, Atlanta, Chamblee, Lenox-Davison's, Atlanta, BAS, Inc., Waynesboro. • **HAWAII** • Computerland, Aiea, Honolulu, Kaneohe, Photo & Sound, Honolulu. • **IOWA** • Computerland, Cedar Falls, Cedar Rapids, Davenport, Des Moines, Marion, Omni Computer, Des Moines, Team Electronics, Waterloo. • **IDAHO** • Computerland, Boise, Golden W Idaho Falls, Inc., Idaho Falls, Silver Creek Irrigation, Picabo. • **ILLINOIS** • Computerland, Arlington Heights, Bloomington, Champaign, Chicago, Downers Grove, Elmhurst, Evanston, Joliet, Mundelein, Naperville, Niles, Northbrook, Oak Lawn, Oak Park, Peoria, Rockford, Schaumburg, St Charles, Compushop, Inc., Buffalo Grove, Chicago, Midlothian, Morton Grove, Oak Park, Rolling Meadows, Computermart, Carbondale, Main Street Computer Company, Decatur, Computer Corner, Edwardsville, Illinois Valley Irrigation, Inc., Havana, Microage Computer Store, Orland Park, Computers Etc., Inc., Posen, Computerland/Springfield Corp., Springfield, • **INDIANA** • Computerland, Anderson, Evansville, Fort Wayne, Indianapolis, Merrillville, Mishawaka, West Lafayette, General Microcomputer, Inc., Elkhart, Michigan City, South Bend, Chester Inc., Francesville, Microage Computer Store, Indianapolis, The Computer Room, South Bend, Hoosier Electronics Computer Center, Terre Haute. • **KANSAS** • Computerland, Hutchinson, Lawrence, Leawood, Topeka, Wichita Amerisource, Prairie Village, Microage Computer Store, Salina • **KENTUCKY** • Computerland, Bowling Green, Lexington, Louisville, CBM, Lexington, CBM Computer Center, Louisville • **LOUISIANA** • Computerland, Baton Rouge, Lafayette, Metairie, New Orleans, Computer Concepts, Lake Charles. • **MASSACHUSETTS** • Computerland, Boston, Reading, Springfield, Wellesley, Entre' Computer Center, Dedham, North Darmouth, Neeco, Needham, Microsource/Financial, Inc., Watertown, The Computer Place, Inc., Worcester • **MARYLAND** • Computerland, Annapolis, Lutherville, Entre' Computer Center, Baltimore, Timonium, The Logical Choice, Baltimore, Pikesville, HLA, Inc., Beltsville, Frederick Computer Products, Inc., Frederick, The Math Box,

The Complicated Way or The Easiboard Way

Five Cables — One Easy Board
Seven Instruction Books — Ten Seconds
Serial Board
Parallel Board
Chronograph
Memory Board
Buffer/Spooler
Three Disk Drives
Print Switcher
Several Days



EASITECH
CORPORATION

EASITECH EXCELLENCE

Exclusively at IBM PC Dealers

2215 Perimeter Park, Suite 22, Atlanta, Ga. 30341 (404) 452-7576

Reader Service #213

Kentwood, Southfield, St Clair Shores **Computermart**, Ann Arbor, Dearborn, E Lansing, Flint, Grand Rapids, Kalamazoo, Saginaw **The Computer Room**, Grand Rapids, Kalamazoo **The Computer Mart, Inc.**, Troy • **MINNESOTA** • **Computerland**, Bloomington Hopkins, Minneapolis, Rochester, Waite Park **Computer Depot** (Daytons Comp. Ctr.), Burnsville, Edina, Minneapolis, Minnetonka **Computer Depot** (Daytons St Paul), St Paul **Microage Computer Store**, Minneapolis • **MONTANA** • **Computerland**, Billings, Great Falls **Triangle Irng. Co.**, Great Falls • **NORTH CAROLINA** • **Surveyors Supply Company**, Apex **Computer South**, Charlotte, Winston-Salem **Computerland**, Charlotte, Durham, Greenville **Entre' Computer Center**, Greensboro, Raleigh • **NORTH DAKOTA** • **Computerland**, Bismarck, Fargo, Grand Forks, Minot • **NEBRASKA** • **Computerland**, Lincoln, Omaha **Abacus**, Omaha **Microage Computer Store**, Omaha • **NEW HAMPSHIRE** • Computerland, Manchester, Nashua • **NEW JERSEY** • **Entre Computer Center**, Allamuchy, Marlton, Paramus, Pine Brook **Computerland**, Cherry Hill, Eatontown, Lawrenceville, Morristown, Northfield Paramus, Somerville, Totowa, Union **Computer Mart**, East Hanover, Green Brook, Iselin, Lawrenceville **Midas Date Systems**, Marlton, Vineland **Vista Computer Center**, Matawan **Bamberger's Garden State Plaza**, Paramus **Computer Encounter**, Princeton • **NEW MEXICO** • **Computerland**, Albuquerque, Santa Fe **Photo & Sound Company**, Albuquerque, • **NEVADA** • **Computerland**, Las Vegas, Reno • **NEW YORK** • The **Computer Room Ltd.**, Albany, Glens Falls **Computerland**, Carle Place, Commack, Ithaca, Johnson City, Little Neck, Massena, New York, Rochester, Syracuse, Tonowanda, White Plains **Future Visions Computer Store**, Melville **Datel Stores of New York**, New York **Futuredata, Inc.**, New York **Macy's Herald Square**, New York **Morris Decision Systems, Inc.**, New York **ASD Office Systems**, Poughkeepsie **The Computer Store**, Rochester **Computer Systems Specialists, Inc.**, Wappingers Falls **Entre' Computer Center**, White Plains • **OHIO** • **The Basic Computer Shop**, Akron, Canton, Cleveland **Computerland**, Canton, Cincinnati, Cleveland, Columbus, Mayfield Heights, Miamisburg, North Olmsted, Warren, Youngstown **Microage Computer Store**, Columbus **The Micro Center**, Columbus **Hudson Computer Systems**, Hudson **Abacus II Microcomputers**, Toledo • **OKLAHOMA** • **Computer Solutions, Inc.**, Midwest City, Oklahoma City **Computerland**, Oklahoma City, Tulsa **Microage Computer Store**, Oklahoma City, Tulsa • **OREGON** • **Computerland**, Portland, Salem, Tigard **New Day Computing**, Portland **NWI Audio Vis. Sys. (Photo & Sound)**, Portland • **PENNSYLVANIA** • **Microage Computer Store**, Allentown **Computerland**, Dresher, Gibsonia, Lancaster, Mechanicsburg, Paoli, Philadelphia, Pittsburgh, Reading, Whitehall **Entre Computer Center**, Mt Lebanon, VR **Data Computer Center**, Springfield • **RHODE ISLAND** • **Computerland**, Providence **Entre' Computer Center**, Providence • **TENNESSEE** • **Computerland**, Chattanooga, Kingsport, Knoxville, Memphis, Nashville **Peter Drew & Associates**, Chattanooga **The Computer Shoppe**, Goodletsville, Nashville **Anderson Computers, Inc.**, Murfreesboro, Tullahoma **Microage Computer Store**, Nashville • **TEXAS** • **Computerland**, Abilene, Amarillo, Austin, Brownsville, College Station, Dallas, El Paso, Fort Worth, Houston, Laredo, Longview, Lubbock, Lufkin, McAllen, Pasadena, Richardson, San Antonio, Sherman, Tyler, Waco **Computer Corner**, Amarillo **Compushop, Inc**, Arlington, Bellaire, Dallas, Fort Worth, Houston, Irving, N Richland Hills, Plano, Richardson, Webster **Computer Concepts**, Beaumont **Compco Computer Centers**, Dallas **Entre' Computer Center**, Dallas, Lubbock **Computercraft, Inc.**, Houston **Photo & Sound Company**, Houston **Agriplex Computer**, Lubbock **Computer Patch**, Midland, Odessa • **UTAH** • **Personal Business Computers**, Cedar City, Salt Lake City **Computerland**, Murray, Orem, Salt Lake City **CTI Computer Store**, Orem • **VIRGINIA** • **Computerland**, Charlottesville, Norfolk, Richmond, Vienna, Virginia Beach, Woodbridge **Entre' Computer Center** (Tnology Corp.), Charlottesville, Hampton, McLean, Rosslyn **United Computer Center**, Chesapeake **The Math Box, Inc.**, Fairfax, Springfield **Small Business Computer Center**, Virginia Beach • **VERMONT** • **Computerland**, Burlington • **WASHINGTON** • **Computerland**, Bellevue, Bellingham, Federal Way, Kennewick, Lynnwood, Renton, Seattle, Spokane, Tacoma, Vancouver **Frederick & Nelsons Computer Depot**, Bellevue **Valmont Northwest, Inc.**, Pasco **Photo & Sound Company**, Seattle • **WISCONSIN** • **Computerland**, Eau Claire, Green Bay, Janesville, La Crosse, Madison, Mequon, Milwaukee, Oshkosh, Stevens Point, Wausau **Microage Computer Store**, Milwaukee

IBM is a registered trademark of International Business Machines Corporation. Motorola is a registered trademark of Motorola Corporation.

Envision a single high-speed communications board with integrated easy-to-use software that emulates any terminal.

It's not just your imagination. It's Linkup.™

At ITI, we know your data communications must be fast, accurate and inexpensive. Our engineers faced the same communications problems you face. That's why they designed Linkup™ for the IBM PC.

With Linkup, you have a high-speed, programmable communications processor integrated with user-oriented software that provides cost effective access to an international network of host computers, terminals and other personal computers. You'll be able to transfer text, graphics, facsimile images, telemetry and program files as easily as dialing a phone number.

Communication modes support high and low speed access to computing and data base services, electronic mail, order entry, credit verification, tele-conferencing and direct marketing.

Linkup is the only communications hardware you'll ever need.

A single plug-in module with the modular software emulates TTY, ASCII block mode, IBM 3101, IBM 2780/3780, DEC VT 52/100 and IBM 3270 and 5250. Terminal emulation modes are changed by a single keystroke without changing diskettes and switching modem cables. And most importantly, the same familiar user command set appears in all modes.

Linkup grows to meet your changing needs.

Future terminal protocol requirements will integrate into our programmable coprocessor. And, Linkup's high-speed data throughput allows you to take full advantage of increases in common carrier transmission line speeds.

Linkup is cost-effective.

Linkup's single communications board does more than several others combined, leaving your computer's precious board slots open for further applications. And its powerful MC 6809 processor chip handles all communications tasks, freeing the PC to service the user interface.

Faster, more accurate transmission means lower costs.

Linkup's integrated design architecture reduces connect charges by transmitting and receiving data at speeds up to 19.2 Kilobaud asynchronous and up to 56 Kilobits per second synchronous without the loss of data throughput normally associated with such speeds. Transfer files at high speed to the PC's disk, then print off-line. And, each line can be checked for error as it's received automatically, retransmitting only those lines in error, instead of entire pages. That saves connect time and character transmission charges.



Our innovative fill-in-the-blanks technique overcomes the tedium of question-answer interrogation and menu approaches.

The user simply enters phone numbers, passwords and job file names on a consistent fill-in-the blanks form. Communication options and commands are displayed on the screen form and selected with a single keystroke.

Linkup works around the clock so you don't have to.

Linkup automatically executes tasks. It dials, signs-on, runs a job unsupervised and maintains a log of its activities. It uploads, downloads and does printouts while you're away. And when you return, your data is ready and waiting, so you can put your time to its best use.

If you want to communicate, call ITI toll-free 1-800-431-3460 for additional information.

Information Technologies Inc.
7850 East Evans Road
Scottsdale, Arizona 85260
(602) 998-1033

IBM PC is a trademark of International Business Machines Corporation.

Linkup Specifications

Speed: 56 Kbps Synchronous, 19.2 Kbaud Asynchronous
Terminal Emulation Modes: TTY, ASCII Block Transfer, DEC VT 52/100, IBM 3101, IBM 2780/3780, and future options include 3270, 5250, Tektronix 40XX.
File Types: ASCII, EBCDIC and Binary.
Automatic Modes: Dialup, Log-on, Job Execution, Answer, Alert, Unattended Job Scheduling.
Communications Interface: Dual channel RS232/423 compatible.
Modems: 103, 212, 201, 208 Bell compatible, Hayes, Vadic, Rixon smart modems, or user defined.
Bus Interface: IBM PC bus compatible.
PC Configuration: PC DOS, 64 Kbytes RAM, 160 KB Floppy, monochrome display minimum. Also supports IBM compatible hard disks, color displays and printers.
Options: Printz™ Print Spooler, Postmaster™ Electronic Mail, Audit™ Billing Summary
Base Price: $795 each, including TTY and Asynchronous block software.

PC World View

News and notes for the computing community

Miriam Medom

The *PC World View* staff is avidly attuned to new developments in computer technology, and we hear lots of rumors, speculation, and advance news that interest us. We want to share the most promising and unusual of these developments, and we'll do that here. We've reserved the "Grapevine" section of this column for industry reports, speculation, and rumors that we find especially enticing.



Grapevine

PC's Corporate Reward

Industry intelligence speculates that IBM will recognize the astounding success of its Personal Computer by creating a separate corporate division for the PC. Such a move would be a departure from IBM's recent tendency to consolidate its marketing operations, but apparently the folks in Boca Raton have earned the honor of being singled out. Don't rush to sell your IBM stock, though—it's all still one big happy company.

Ma Bell's Indecision

The newly deregulated, decentralized phone company—Ma Bell to most of us—has been rumored to be readying several microcomputers for imminent release. Now industry sources report that American Bell, one of Ma Bell's many subdivisions, has prototypes for four microcomputers: two are planned as low-cost consumer items and two are slated to compete with office systems such as the PC or Apple's Lisa.

But, observers note, Ma Bell is reluctant to enter the volatile computer market just yet. Reportedly the phone company wants to wait to release its micros until ancillary products are also ready—particularly the technology for linking the computers in local area networks and long-distance communications. So we may have to wait some more for a ringing announcement from Bell.

A Franklin PC?

Franklin Computer Corporation, the folks who made a highly successful Apple II lookalike computer, may now be planning one that is IBM PC-compatible. Two signs of obvious growth at Franklin are the recent expansion of its manufacturing facilities and the doubling of its staff. A more telltale sign of PC emulation may be the hiring by Franklin of William Sydnes as vice-president of engineering. Sydnes previously worked for IBM, where he was the principal design engineer for the PC.

Although Franklin's president, Joel Schusterman, will not confirm or deny plans to offer a PC lookalike, he readily acknowledges, "We look at plug compatibility as a very essential thing."

Going Establishment

If any corporate entity can be said to represent the Establishment, certainly IBM qualifies for the title. Now the company is reportedly giving that title to one of its new products, the Establishment Information System, a local area network for office use. This system is rumored to use Intel's 80186 microprocessor as its computing brain—that's the more advanced chip that is compatible with the PC's 8088 processor. Yet this Establishment system is said to be incompatible with the PC. Instead, it is apparently intended to perform most operations now done by the Displaywriter and Datamaster systems.

Chip Slips

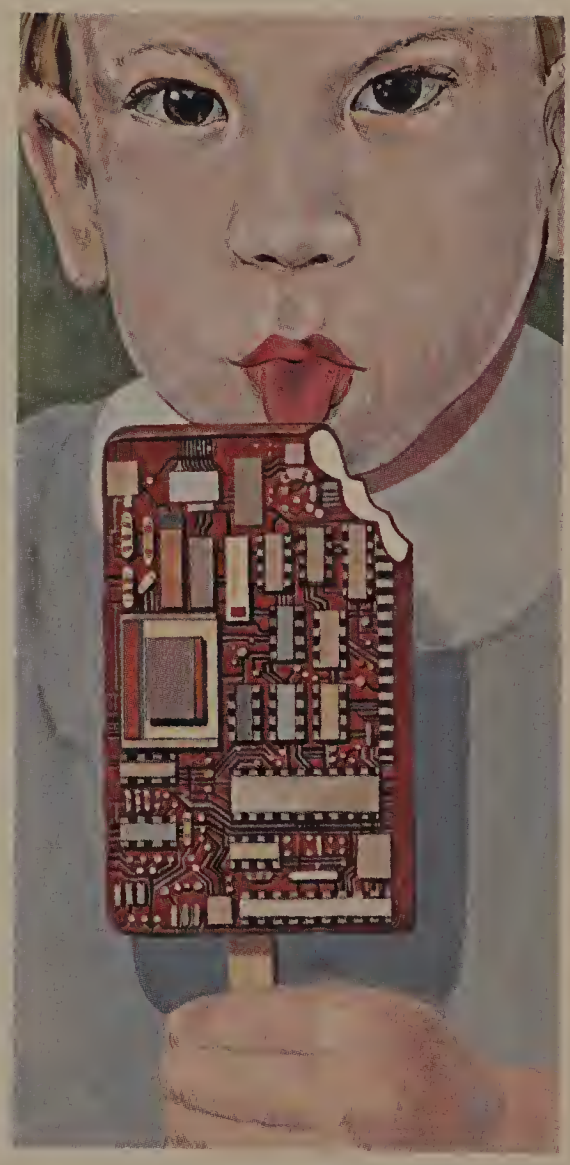
Speaking of Intel's 80186 microprocessor, one industry source reports that a recent problem with the chip has required replacement of the processor in machines where it was originally installed. The bug supposedly involves improper execution of one type of move instruction. The problem occurs when the instruction

is given immediately after information has passed from memory directly to the processor without going through any peripheral interface. The problem has been corrected in new versions of the 80186.

Kid Stuff

Kids have been dumping several tons of quarters down video game coin slots every hour for a couple years, so it's not surprising that the video and computer craze is spawning more traditional media for young people as well. The top of the list in entertainment, of course, is the movie *War Games,* the box-office sensation that features a teenager with his Imsai 8080 playing shoot-'em-up with the mainframes in the nation's nuclear attack warning system. In fact, *War Games* is so informative on the subject of breaking into supposedly secure computer systems that several large corporations have referred to the movie in their standard protect-your-data/change-your-password memos.

On a less threatening front, a new magazine and a television series will also feature kids and computers this fall. The magazine is *Digit*, the brainchild of San Francisco publisher and mother Lassie Benton. *Digit*'s recently released first issue features robotics as well as 14 programs for various home computers. The magazine's editorial board is made up of 15 kids (soon to be increased to 30) who contribute story ideas and critique each issue's content. Many of *Digit*'s articles are also written by young people with editorial help from the magazine's adult staff.



Digit is published bimonthly. A one-year charter subscription is $8.95, and the magazine costs $1.95 per issue on newsstands. For more information contact *Digit,* P. O. Box 29996, San Francisco, CA 94129, 415/931-1885.

A new television series, "Whiz Kids," will soon feature "teenage computer geniuses who battle the forces of evil through the amazing things they do with computers," according to a press release about the series. "Whiz Kids" is the invention of producer Philip DeGuere, who also created "Simon and Simon." DeGuere is no stranger to computers; he has replaced typewriters in his office with micros and even used The Source to gather viewer response to "Simon and Simon" when it debuted two seasons ago. DeGuere has gotten IBM, Apple, and Xerox to provide computers for "Whiz Kids," and he promises that the show "will accurately reflect the reality of computers."

We hope this hour-long adventure program serves both kids and computers well, but we wonder how even whiz kids can "reflect the reality of computers" while at the same time "doing battle with the forces of evil." Maybe for starters the amazing teenagers could zap their press agent's comic-book prose.

COMPAQ Con-fusion

If your COMPAQ computer starts making funny noises and your CRT suddenly goes blank, relax. It probably isn't your fault. The Texas-based COMPAQ Computer Corporation discovered in May that some software packages "execute a nonstandard command to the video control logic" that causes a fuse in the monitor to blow out. Ken Price, COMPAQ director of marketing communications, stressed that such incidences are "extremely rare." The problem occurs with "less than 1 percent of the software on the market," he said. A recent modification to the monitor assembly design has rectified the fuse problem.

Price said that COMPAQ dealers were notified of the problem and given the serial numbers of the defective computers. The dealers were authorized to contact customers and

replace each computer's monitor free of charge. Computers do not have to be under warranty to qualify for this replacement offer. Replacing COMPAQ's monitor is about a half-hour operation, Price said.

Price would not say how many COMPAQ computers need new monitors. However, one source told *PC World View* that COMPAQs with serial numbers 1427 to 7017 are being recalled.

Big Blue's News

IBM's Logo

Logo seems to be coming on strong for the PC. Digital Research announced its DR Logo in January (though it's not available yet), and Harvard Associates of Cambridge, Massachusetts, has already released a PC version of the language. IBM now has joined the fray, promising that its Logo will be available late this year. A preliminary version of IBM's Logo is reportedly being used in some of the firm's educational programs.

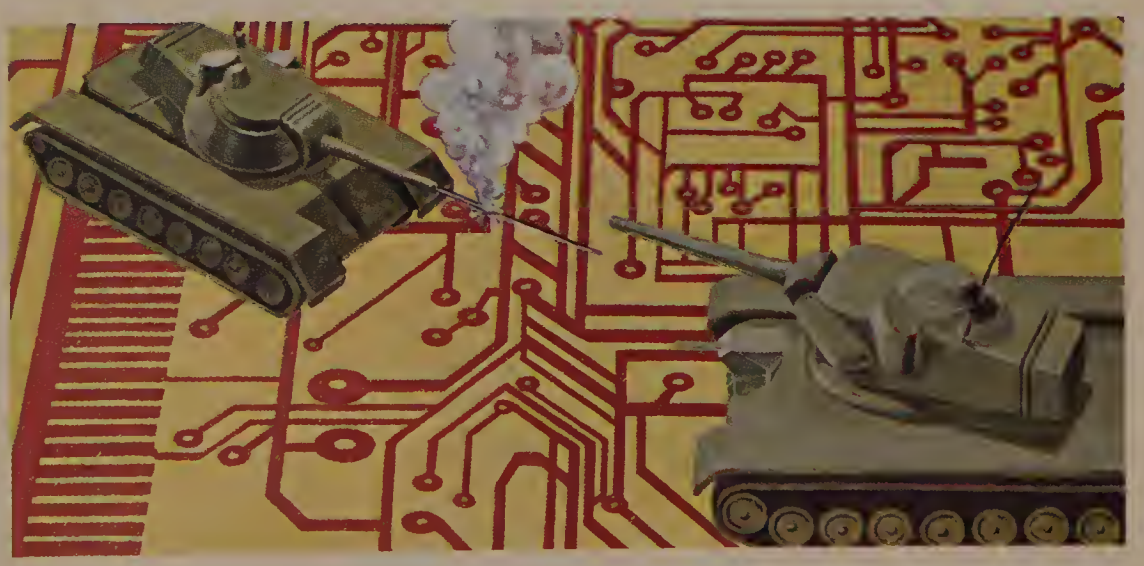
IBM Switches Phone Deals

In short order recently, IBM acquired 15 percent of Rolm Corporation and canceled its working agreement with Mitel Corporation. Both of these companies specialize in designing and manufacturing telephone switching equipment and similar devices—an area in which IBM has had no notable successes as yet. The Rolm-IBM pact was established so that the two firms can work together on communications among large computers, telephone exchanges, individual telephone lines, microcomputers, and terminals.

The Missing Chip

With its announcement of the Intel 8087 coprocessor for the PC (and the XT), IBM has finally clarified the purpose of the empty socket on the motherboard. Although other suppliers have already offered an 8087 and some software to use it for the PC, IBM has not until now officially acknowledged that the computer was designed to accommodate the number-crunching chip. The 8087 will be supplied as part of a pair of chips; the second is a replacement 8088 processor designed to work in tandem with the 8087. The chip set will cost $260.

To make the 8087 more easily accessible to PC users and programmers, IBM will also release a version of its APL language that is especially well suited to the 8087.



Lots of Land

The battle of trademarks and company names may just be beginning. Recently, ComputerLand Corporation sued a start-up firm, Softwareland, to keep it from using *land* in its name. ComputerLand claims that the similarity in names and products would confuse potential customers. Softwareland, which is based in Scottsdale, Arizona, plans to open a dozen software stores by mid-1984.

Meanwhile, ComputerLand has established a new marketing arm called ComputerLand Large Account Support and Service (CLASS). As its name implies, the new program is aimed at Fortune 500-type accounts and will provide discount prices for volume purchases of equipment.

Sharing the Wealth

Most computer stores are doing a booming business these days, and this good fortune has motivated at least one dealer to share the wealth. Prodigy Computer Center of Iselin, New Jersey, has been giving classes in computer literacy to anyone who is unemployed. The class meets one day a week and presents the fundamentals of computer use to all comers. The immediate goal of the class' limited hands-on exposure to computers

is to provide familiarity with the machines and their uses and to help unemployed clerical workers upgrade their skills to include computer proficiency.

This notion of community service is a good one, and Prodigy has received favorable publicity for its efforts. If more business people would take this approach, we might begin to conquer unemployment and bridge the computer literacy gap in the process.

Move Over, Hallmark

Contributing Editor Larry Magid recently discovered yet another sign of the computer's pervasive influence on our lives. Now, Larry reports, we can all send computer greeting cards. Here are the details.

Computer Greetings provide high-tech humor for that special occasion. Shaped like floppy disks and adorned with pertinent cartoons, these cards offer more messages than an on-line data base. There are invitations (You are invited for a byte at my place), get well cards (Got a bug in your system?), and friendship messages (I am user-friendly, are you?).

The line of 25 greetings covers most events, including belated birthdays (Your birthday slipped my memory) and weddings (May you interface with happiness). The only thing missing from this line of greeting cards is a message of condolence—the cards' creator probably thought better of remarking about "terminal cases."

Computer Greetings are the work of Michelle Whitman, a former software salesperson turned entrepreneur. Although the cards are the same size as 5¼-inch disks, Whitman recommends slipping them into the mail rather than the disk drive. The cards cost $1.20 each and can be purchased at computer stores. For more information contact Computer Greetings, 2661 Lakeview, San Leandro, CA 94577.

Hallmark hasn't yet come out with its own version of Computer Greetings, but the greeting card giant has added a computer dimension of its own. In a recent television advertisement, a group of women pass a birthday card from desk to desk to be signed. Clearly visible on one woman's desk—a PC.

Recycling Floppies

Our correspondent Patricia Regehr suggests a new *PC World View* pastime for computer users—devising ways to recycle worn-out floppy disks. Patricia gets the competition started with these floppy-saving ideas.

Disk Throw: Place an empty beer or soda bottle in the middle of the room and stand back about 4 feet. Now gently toss the worn-out disk so that its hub settles over the bottle's neck (no easy feat). As a contest, the disk throw could be a good money raiser for your next computer fair or user group gala.

Earrings: Punch a small hole in one corner of the disk and attach an earring wire (available at jewelry or crafts stores) to it. Next affix the wire to your ear (or ears, if you've made a pair). For somewhat less showy disk earrings remove the mylar disk from its jacket and wear it. In either case, watch out for low-flying branches.



Templates: Carefully cut the disk jacket on one side and remove the mylar disk. Use the jacket as a template for drawing two sizes of circles and one oblong shape. You could give computer graphics a new meaning.

Floppy Frisbees: There are two variations on this theme. If you've already removed the mylar disk, you have an almost-lighter-than-air flying saucer. If the disk is still in its jacket, try sailing this square object.

We'd like to hear about other good uses for old floppies—send them along, please (the ideas, not necessarily the floppies). And be sure to back up the data on the obsolete disks before recycling them.

Summer Sports

Yes, even computer junkies take time away from the keyboard, as this report from *PC World* staffer Katie Seger reveals.

The yet-unnamed *PC World* softball team (the PCBs?) defeated its cross-bay rival, computer book publisher Sybex, in a close 15-14 summer battle. The Sybex team fought back from an 8-1 third inning deficit to take a 14-11 lead in the top of the 9th inning. But *PC World*, sending its heavy hitters to the plate, chalked up four runs to win the game in the last half of the inning. (It's just possible that *PC World* was aided in the win by the fact that the game's umpire was Seger herself, who was sidelined with a bum knee.)

Good Licks

A California ice cream maker may be the first to offer a computer age flavor. Old Uncle Gaylord's ice cream parlors in Silicon Valley have been scooping plenty of Computer Chip. This new concoction is apple-flavored ice cream with chocolate chips. Maybe we could get them to make a blue-and-white striped cone to give IBM equal time.

PC World View *welcomes contributions from readers, and we'll pay up to $50 for the items we use. Please include your name, address, and phone number with your contributions. Send them to* PC World View, PC World, *555 De Haro St., San Francisco, CA 94107.*

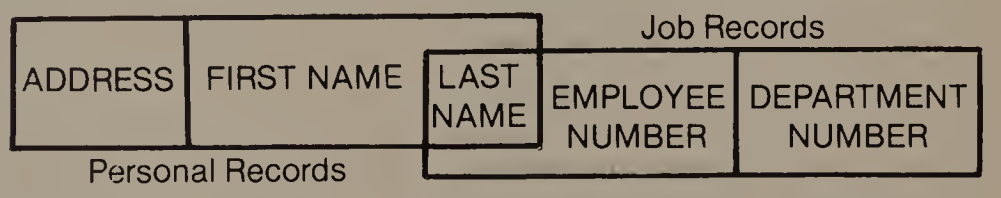
dBASE WINDOW and NEW! dBASE DOOR

PRODUCTS FOR THE FUTURE— AVAILABLE NOW!

dBASE WINDOW is a full-fledged dBASE II Application Generator. Working from your design, dBASE WINDOW generates and runs record keeping applications of all kinds, quickly and effectively. Just draw your input screen and report formats and dBASE WINDOW will create your application for you.

dBASE DOOR is a new product for those who only require the report generating capability of dBASE WINDOW. dBASE DOOR can be used with existing dBASE II command files and databases, providing the most powerful report generation available for dBASE II. If you own QUICKCODE or AUTOCODE, you need dBASE DOOR!

dBASE WINDOW and dBASE DOOR have the unique capability to build upon a relation between two independent databases. Here's how:



Any two databases can be linked by a common field. In this example, the field 'last name' establishes a relationship between the personal records file and the job records file. Using dBASE WINDOW or dBASE DOOR, you may now print reports which contain data from *both* databases!

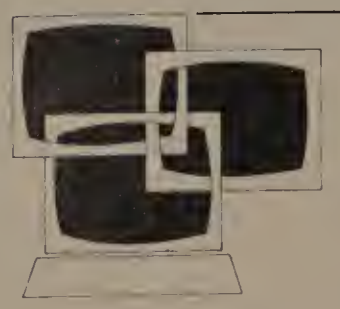
Compare the features of dBASE WINDOW with any program generator:

- Any number of databases may be present in an application
- Up to five indexes per database
- Real time interactive queries
- Built-in powerful free-form report generator, also available separately as dBASE DOOR
- Uses two databases in one report
- Easy to add custom code when necessary to meet special needs.

Requirements: CP/M® and dBASE II 2.3B; CP/M-86® or PC-DOS and dBASE II 2.3D. Disk space required for dBASE WINDOW: 400K or more.

dBASE WINDOW is $249, dBASE DOOR is $149, either manual only $20 (manual price will be credited toward future purchase of program).

Tylog



Tylog Systems, Inc., 9805 S.W. 152 Terrace, Dept. pw. **Miami, Florida 33157 (305) 253-5942**

To Order: Call today or send check, full name and address, telephone number and disk format. Credit card buyers send card number and expiration date. We accept COD, VISA, Mastercard and prepaid mail orders. Add $5.00 shipping except for prepaid mail order for program. Florida residents add 5% sales tax.

dBASE II is a trademark of Ashton Tate. CP/M® and CP/M-86® are registered trademarks of Digital Research, Inc. Quickcode and Autocode are trademarks of Fox & Geller and Stemmos Ltd.

Dealer and Distributor inquiries invited.

MasterCard and Visa accepted.

Reader Service #384

Start ahead. Stay ahead.

The Columbia Family:
IBM-PC compatibility
plus outstanding value
and performance.



Today, Columbia offers you the highest level of IBM-PC hardware and software compatibility.

Each Columbia microcomputer is delivered with software worth thousands of dollars for word processing, financial planning, communications, and more.

Stay ahead with Columbia's economic multi-user capabilities and quality expansion products.

Choose the very practical Columbia VP Portable, $2,995. Or, the flexible Columbia MPC, $3,395. The Columbia MPC with hard disk is $4,995. All prices include CRT controller with graphics and keyboard.

Call (301) 992-3400 for the name of the dealer or distributor nearest you. Serviced and supported worldwide. National service by Bell & Howell Service Company.

World Headquarters:
9150 Rumsey Road
Columbia, MD 21045
(301) 992-3400
TWX 710-862-1891

West Coast:
3901 MacArthur Blvd.
Suite 211
Newport Beach, CA 92660
(714) 752-5245
Telex 277778

Europe:
Limitenstr. 94
4050 Moenchengladbach 2
West Germany
02166-47097
Telex 852452

COLUMBIA
DATA PRODUCTS, INC.

Distributors in Australia, Belgium, Colombia, Denmark, Hong Kong, Israel, Italy, Malaysia, Netherlands-Antilles, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Venezuela.

IBM and IBM PC are registered trademarks of International Business Machines.

DISCOVER THE DYSAN DIFFERENCE

Dysan Software Duplication:



It's your name on the package label. And your company's reputation on the line. Whether your program retails for $40.00 or $400.00, or is for company internal distribution, the cost of duplicating it on diskettes is just a fraction of the value of your product. Doesn't it make sense to protect the time, money and talent invested in your software with the finest and most complete software duplication services available?

Quality Software Deserves the Quality Media.

Dysan's software duplication services are unsurpassed for fidelity of reproduction. Not only is your program copied unerringly onto the finest media made—the Dysan diskette—but it's also copied on proprietary equipment manufactured by Dysan, exclusively for Dysan. Plus Dysan offers you the widest variety of support services available—from software protection to serialization and packaging.



Reader Service #63

Isn't it time you discovered the Dysan difference? For more information on Dysan software duplication, fill out and return this coupon today, or call (800) 551-9000.

Dysan CORPORATION

Dysan Software Duplication Division
5201 Patrick Henry Drive
Santa Clara, CA 95050
(800) 551-9000
(408) 988-3472

Please send me more details on Dysan's Software Duplication Services.

Name: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: (_____) _____



Introduce your IBM-PC to a fast-talking card sharp.

The IDEAComm 1200: Fast, reliable communications on a plug-in card.

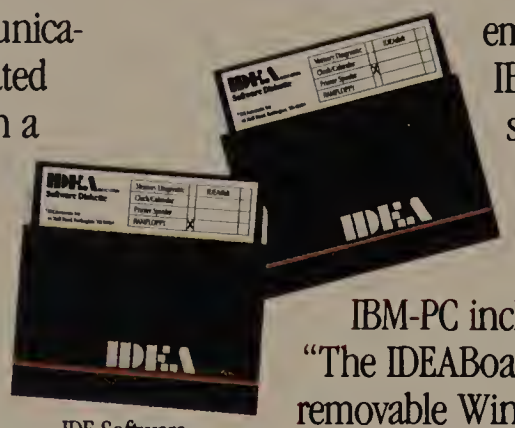
Now you don't need an external modem to get 1200 baud communications capability for your IBM-PC. The IDEAComm 1200 is an integral modem that combines the functions of an in-board asynchronous communications card and an out-board modem in one integrated plug-in unit. Snap it into an expansion slot, plug in a modular telephone jack, and you have direct 1200 *or* 300 baud communications without the confusion and added expense of external boxes and cables. And there are no switches to set; the speed is software-selectable or automatically selected by the card. Plus, we've designed in outstanding reliability: four powerful on-board microprocessors replace conventional analog circuitry with digital precision and reliability.

One Card That's a Great Deal

The fast-talking IDEAComm 1200 is one sharp card: it eliminates the need for an external modem, gives you 1200/300 baud communications capability with the exceptional reliability of digital design; provides an additional plug so you don't lose regular telephone voice communications; and includes a standard RS232C interface and connector that can be used as an additional serial port. All for only $545. That's about the cost of a conventional external modem alone, saving you the entire cost of the internal asynchronous card.

One Card Gives You a Full Hand

The IDEAComm 1200 comes complete with software diskette enabling easy, menu-driven selection of all communications, autodial, and auto log-on procedures, and easy recall at the touch of a single key. It also allows the IDEAComm 1200 to work with most other terminal emulation packages—including IBM Comm 2.0 communications software.



IDE Software

We've Stacked Our Deck With Better Ideas

IDE's Better Ideas for your IBM-PC include expansion memory boards, "The IDEABoard" combination boards, fixed or removable Winchester disk drives for either internal or external mounting, and printer spooler and RAMFloppy disk emulation software. We have Better Ideas on product support, too. Superb technical support and documentation, including full programming specifications for the IDEAComm 1200 . . . an aggressive pricing policy . . . a unique upgrade policy that lets you trade up any IDE product for another in our line . . . and our full year warranty.


Expansion Memory Board

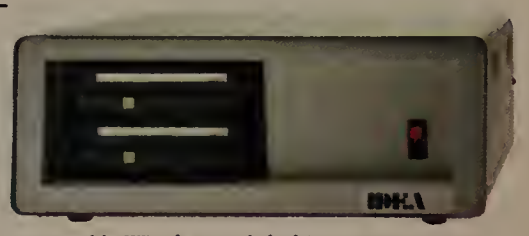

"The IDEAboard"

Get the IDEA

To see IDE's Better Ideas for yourself, contact any of the knowledgeable dealers listed below. If there is no listing for a dealer near you, call us. We'll provide you with the name of your nearest dealer or take your order over the phone.

1-800-257-5027

(In Massachusetts, call 617-275-4430)



Removable Winchester disk drive

Technical Specifications

Speed	**IBM Port**
0-300 bps or 1200 bps	COM 1
Data Format	**Modem Compatibility**
Serial, binary. 7-8 data bits, 1-2 stop bits	Bell System 103 or 212A in both Originate and Answer mode
Dialing Capability	**Physical Data**
Touch-Tone (TM) or rotary dial pulse	3.9″ x 10.8″ x .6″ (one card slot)
Operation	
Full Duplex	

IDE Associates

Better ideas for personal computers.

IDEAssociates, Inc. 7 Oak Park Drive, Bedford, MA 01730

IDE Dealers: ☐ Alaska: VFM Electronics, Fairbanks ☐ Arizona: Abbot Data Products, Glendale; Computer Emporium, Tucson ☐ California: Q-Bits, Mountain View; Stoneware Ltd., La Jolla ☐ Connecticut: The Computer Establishment, Old Saybrook; MicroAge, Danbury; American Business Computers, Groton; Creative Systems, E. Granby ☐ Hawaii: Peripherals Hawaii, Kahuku ☐ Illinois: DM Micro Systems, Collinsville ☐ Iowa: ComputerLand, Des Moines ☐ Kansas: Computype, Manhattan ☐ Massachusetts: Arby Corporation, Cambridge; TEK Microsystems, Boston ☐ Michigan: The Computer Workshop, Houghton; TransNational Corp., Troy; Computer Rentals, Royal Oak ☐ Minnesota: Computer Depot/Daytons Computer Centers, Minneapolis, St. Paul, Burnsville Center, Ridgedale, Rosedale, Southdale ☐ Nebraska: ComputerLand, Lincoln; ComputerLand, Omaha ☐ New York: Future Data, NYC; Oppenheimer Software, NYC; Yankee Computer Services, Putnam Valley ☐ North Carolina: Surveyor's Supply, Apex; Computer South, Charlotte; Microcomputer Sales, Fayetteville; The Computer Exchange, Durham ☐ Ohio: U-Compute, Toledo ☐ Oklahoma: Advanced Financial Technology, Oklahoma City; Biologic Instruments, Stillwater ☐ Pennsylvania: Software Projections, Inc., Flourtown ☐ South Carolina: Berry's Office Automation, Lugoff ☐ South Dakota: Computer Terminal, Sioux Falls ☐ Tennessee: FICON, Nashville ☐ Texas: MicroSpec, Plano; Video Station, Plano; Southwest Automation, Houston ☐ Utah: Weidner Communications Corp., Provo ☐ Virginia: Micro Solutions, Reston ☐ Washington: Telecalc, Seattle

International Distributors: Austria, Switzerland, West Germany: Computer 2000 GmbH. Munich ☐ United Kingdom: KPG-Hardware House, London ☐ France: Micro Connection International, Paris ☐ Israel: O.D.C. Systems, Natanya

Reader Service #223

KEY TRONIC PERFECTS THE IBM* PC KEYBOARD



Familiar Key Legends Rather Than Symbols

SHIFT Key in Familiar Typewriter Location

LED Indicators On All Lock Keys To Show Status

RETURN Key in Familiar Typewriter Location

Convenient ENTER Key

Enhance your IBM* Personal Computer System with a Key Tronic keyboard peripheral. This low-profile keyboard is plug-compatible and has familiar key placement. It also features reliable microprocessor electronics, solid-state capacitance switches, and positive tactile feedback.

Special keyboard available for the handicapped — factory direct.

*IBM is a registered trademark of IBM Corporation

Price: $269.00
To Order Model KB-5150 Call Toll Free
1-800-262-6006
(8 am-4 pm Pacific Standard Time).
Warranty information may be obtained, free of charge, by writing to the address below.

key tronic™

THE RESPONSIVE KEYBOARD COMPANY

DEPT. E • P.O. BOX 14687 • SPOKANE, WASHINGTON 99214 USA

*IBM is a registered trademark of IBM Corporation

AUTHORIZED DISTRIBUTORS:

PERIPHERAL SUPPORT, INC.
Chicago, IL (312) 593-5900
SSE PRODUCTS, INC.
Elmont, NY (516) 872-9001
QED ELECTRONICS, INC.
Philadelphia, PA (215) 657-5600
RHINO SALES COMPANY
Brighton, MI (313) 227-1788

DIGITAL ENTRY SYSTEMS, INC.
Boston, MA (617) 899-6111
COMPUTER-MATE, INC.
Dallas, TX (800) 442-4006 (Texas)
(800) 527-3643 (Continental U.S.)
COMPONENTS UNLIMITED, INC.
Lynchburg, VA (804) 384-6000

BASIC TIME
Los Angeles, CA (213) 538-9711
(800) 323-8437
C-J SALES, INC.
San Francisco, CA (415) 941-6892
J C SALES
Los Angeles, CA (213) 340-6136
FORESIGHT COMPUTER PRODUCTS, INC.
Seattle, WA (206) 747-4005

FUTURE ELECTRONICS, INC.

Montreal, Quebec	(514) 694-7710
Ottawa, Ontario	(613) 820-8313
Toronto, Ontario	(416) 663-5563
Calgary, Alberta	(403) 259-6408
Edmonton, Alberta	(403) 486-0974
Vancouver, B.C.	(604) 438-5545

Reader Service #229

cdex™

Training for the IBM® Personal Computer Makes Using the IBM® PC Easy.



The IBM® PC is one of the best personal computers manufactured, but it still takes a considerable amount of time to learn how to use. That is . . . until now!

Cdex Training for the IBM® PC Personal Computer makes learning how to use the IBM® PC straightforward and efficient. In an hour, you can master the material on the Cdex disks and begin using the IBM® PC.

It's tough to learn to use a computer from a book. That's why Cdex Training for the IBM® PC is contained on three disks and is:

Highly Interactive . . .
Creating a dialogue with you and serving as your personal tutor.

Completely Self-paced . . .
You set your own learning time.

Graphically Oriented . . .
Remember, a picture is worth a thousand words.

Usable Now and Later . . .
A clear and concise training and reference program for the first-time or experienced user.

Cdex Training Programs run on the IBM® PC and XT Computers, COMPAQ® Portable Computer, Apple® *//e*, II Plus and III Computers, DEC Rainbow® 100 Computer and Texas Instruments Professional Computer. See how effective a Cdex Training Program can be; ask your computer dealer for a demonstration.

Cdex™ Training Programs are available for:

The VisiCalc® Program

The WordStar™ Program

The SuperCalc®/SuperCalc²® Programs

The EasyWriter II™ Program

How to Use Your IBM® Personal Computer with CP/M-86® and Concurrent CP/M-86™

How to Use Your IBM® Personal Computer with PC DOS

How to Use Your Apple® *//e* Personal Computer

How to Use Your Texas Instruments Professional Computer with MS DOS

Managing Your Business with the Lotus™ 1-2-3 Program

Managing Your Business with the MULTIPLAN™ Program

Managing Your Business with the VisiCalc® or VisiCalc® Advanced Version Program

Managing Your Business with the SuperCalc™ or SuperCalc²™ Program

The dBase II® Program

IBM® PC DOS 2.0

DB Master™-Version 4

The BPI® General Accounting Program

IBM® Asynchronous Communications

State of the Art™ General Ledger

Peachtree General Ledger

Making Business Decisions Using the Lotus™ 1-2-3 Program

Making Business Decisions Using the MULTIPLAN™ Program

Making Business Decisions Using the VisiCalc® or VisiCalc® Advanced Version Program

Making Business Decisions Using the SuperCalc™ or SuperCalc²™ Program

Cdex™ Training Programs
We make it easy.

cdex™

Cdex Corporation
5050 El Camino Real
Los Altos, CA 94022
415 964 7600

NEC's crisp, clear, high-performance JC1203 RGB color monitor, an industry standard. Also available, the JC1212 composite video version

NEC's classic JB1201 green monitor, one of microcomputing's performance legends. Easy on the eye, and the checkbook

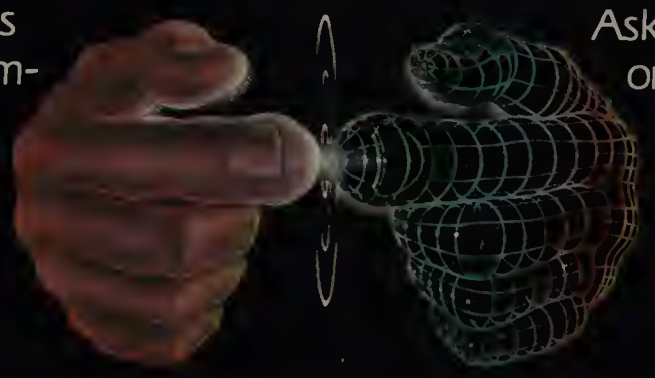


Our impressive new NEC dot matrix printer. Parallel interface, 100 cps, 2K buffer, pin or friction feed. Stunning performance and compatibility in the hottest new peripheral of the year.

Give your IBM system some NEC, and watch its performance soar.

Peripherals from NEC can make almost any computer system better.

Our sparkling new JC1203 color monitor is plug and pin compatible with the 16-color IBM® PC, and delivers the bright, sharp, clear, and stable screen image for which the entire NEC line has long been famous. Similar compatibility is available to owners of Apple II®, Radio Shack®, and Atari® computers, not to mention our own outstanding NEC PC-8000 series. Also available is a brand new, extremely low cost, NEC green monochrome monitor, the JB1260, perfect companion for an Osborne®, for instance.



Ask your dealer for a demonstration. Or write us at 1401 Estes Avenue, Elk Grove Village, IL 60007.

Productivity at your fingertips™

NEC

NEC Home Electronics (U.S.A.), Inc.
Personal Computer Division

Nippon Electric Co., Ltd., Tokyo, Japan

Reader Service #124

A new era dawns on the datascape.™



Envision the **datascape**™ of the future:
- Networked PC's
- Database Hardware
- High Speed Winchester control

In one bold stroke, Cogent™ has solved the problem of simultaneous distributed data access in networked PC environments with the Database Machine.™

As a **Winchester Controller**, the Database Machine™ is optimized for high speed intelligent control and transparent access.



As a **data base** co-processor, the Database Machine™ implements hardware versions of existing database software in high speed multi-user environments.

In a **networked** environment, the Database Machine™ manages multi-user access to the distributed database.

The **Database Machine**™
- IBM-PC® plug compatible
- 8 Mhz 80186 co-processor
- LSI Winchester controller
- Imbedded database silicon software
- 64 K high speed triple ported buffer
- 128 K multi-task RAM

IBM-PC is a registered trademark of IBM

cogent™

P.O. Box 926, Friday Harbor, WA 98250, (206) 378-2929.

Reader Service #358



Announcing the Eagle PC. From $1995, simply a better PC.

Eagle clears the air on what it takes to buy a computer.

Announcing the Eagle PC. This compact, economical computer gives you a headstart with its 16-bit microprocessor. User friendliness to a degree which may only be termed: simplicity with elegance. Just plug it in, flip the switch, and go to work.

The Eagle PC is compatible with hardware and software for the IBM personal computer, offering you a host of hardware extras, and your choice of programs from a large library of MS-DOS business and personal application software.

Save time without losing space. Silent, compact and modular, the Eagle PC is small enough to fit on a credenza. Its handsomely sculpted keyboard designed for word processing and financial planning conveniently stores inside the processor enclosure when not in use to save space.

Eagle productivity organizes your business. The Eagle PC is available at a base system price of $1995. Complete, turnkey systems for under $3000 include operating systems, word processing, and financial planning software at no additional charge. For those needing greater disk storage, the Eagle PC-XL, with 10 megabytes of hard disk storage, starts at $4495. High resolution graphics are standard.

Designed for the first-time computer user, the Eagle PC keeps pace with your growth. It is expandable, so you can add memory, additional disk storage, peripherals, and other options to build a system that will expand with your needs.

The Eagle PC. Simply, a better PC.



Also Announcing New $1595 8-Bit Eagle Power:

Introducing the Eagle IIE Series. Economic sense for business. All models of this exciting product line include disk storage, the CP/M operating system, word processing, financial planning, and the CBASIC programming language. What's more, all models include a full size display, a keyboard tailored for word processing, and Eagle's renowned user-friendly interface. Starting at $1595, the Eagle IIE Series is the best value in the computer industry today.

See Eagle Power in action today. For names of Eagle dealers nearest you, phone toll-free 800-538-8157, Ext. 938. In California 800-672-3470, Ext. 938.

EAGLE COMPUTER

Above and beyond.

IBM is a registered trademark of International Business Machines Corp.
MS-DOS is a trademark of Microsoft Corp.
CP/M and CBASIC are registered trademarks of Digital Research, Inc.

Reader Service #212

Looking Good!



Composite Color
Attractively Priced

- **Fine Resolution**—350 x 350 lines with 400 at center.
- **Full Compatibility with IBM PC**—as well as Apple II, Apple III, and many other popular personal computers.
- **Proven BMC Quality, Performance and Reliability.**

Contact your local dealer or call BMC direct for the dealer nearest you.

IBM® is a registered trademark of International Business Machines; Apple® is a trademark of Apple Computer, Inc.

BMC USA

Setting the standard in price and performance.

LOS ANGELES
16830 South Avalon Blvd.
Carson, CA 90746
Telex: 664258 BMC GDNA
Phone: 213-515-6005

NEW YORK
450 Barell Avenue
Carlstadt, NJ 07072
Phone: 201-939-7079/7061

Reader Service #343

From your mind's eye to the screen.



Bring images to life, with color, resolution, and the speed of thought.

Use CONO#GRAPH™ — the intelligent color display graphics system for your IBM PC. CONO#GRAPH delivers the performance of a professional graphics workstation for the price of a business graphics system.

The modular CONO#GRAPH system lets you start with the CONO#COLOR™ Adapter for quality color and high resolution, and later add the optional CONO#GEN™ module for increased processing power and speed.

Choose from 256 colors.

The CONO#COLOR Adapter provides a spectrum of 256 colors. Select a palette of 16 colors for simultaneous on-screen display. Modify the palette dynamically to provide instantaneous color changes and special effects including motion.

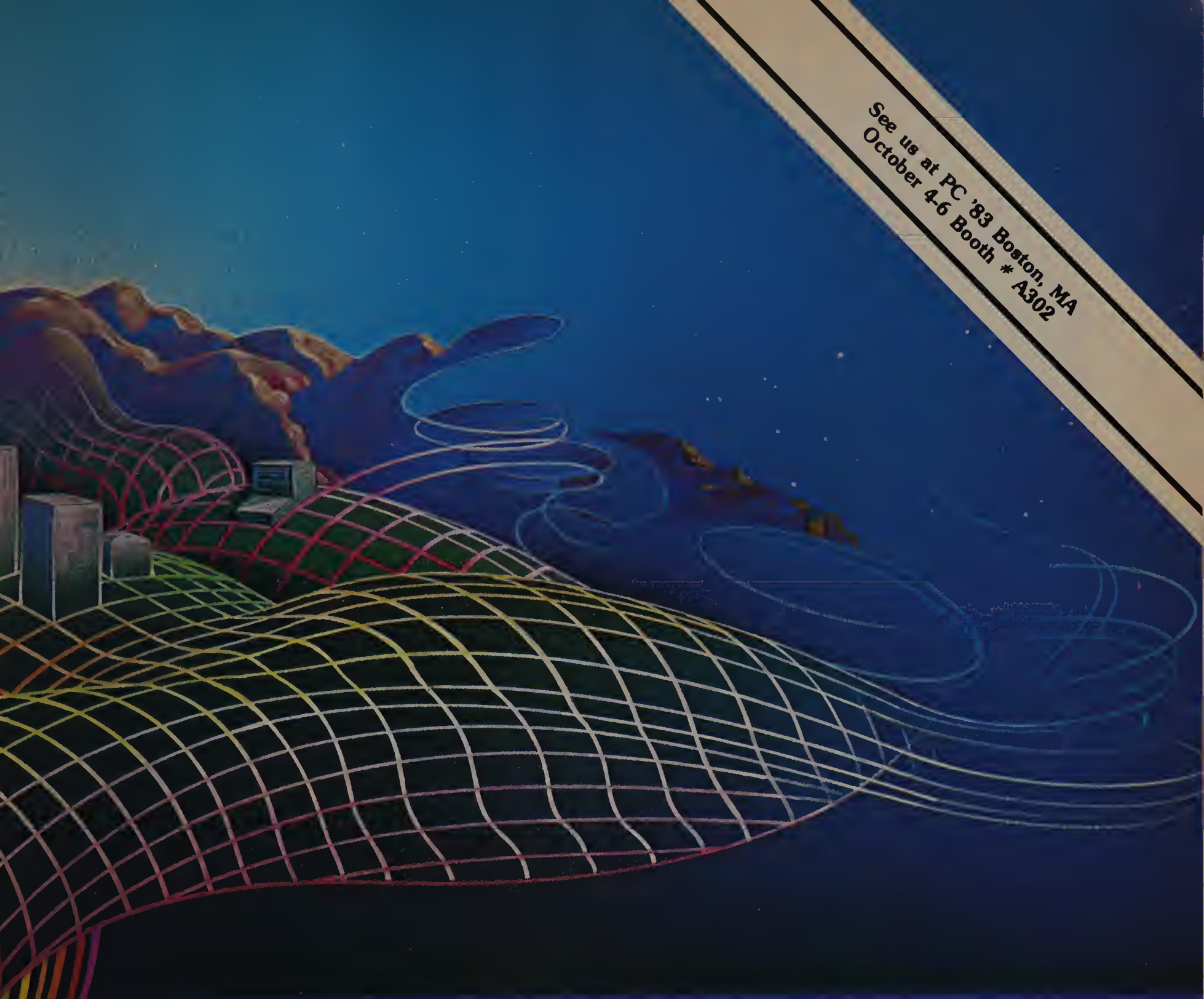
Resolution to 640 x 400.

The CONO#COLOR Adapter supports IBM-compatible resolutions of 320 x 200 and 640 x 200, plus four other modes, up to 640 x 400, each with 16 of 256 on-screen colors. And up to four selectable pages of video memory let you modify one page while another is being displayed — for special effects like animation.

The CONO#COLOR Adapter gives you more.

The CONO#COLOR Adapter's 128K bytes of high speed memory and unique design will

IBM and IBM P.C. are registered trademarks of International Business Machines Corp.



reduce your image build-up time, and eliminate any flicker when scrolling. Four different output channels are provided—including IBM- compatible digital IRGB-as well as RGB analog, true NTSC at all resolutions, and channel-selectable RF. The CONO#COLOR Adapter also features a light pen interface capable of resolving +1 pixel, and an interface to the CONO#GEN high performance graphics processor.

Add CONO#GEN for speed and processing power.

CONO#GEN is a powerful graphics processor that greatly reduces image creation and manipulation times. Its dedicated Motorola 6809 microprocessor frees your IBM PC's microprocessor to perform other tasks. Special purpose hardware generates vectors, circles, ellipses (at any orientation), arcs and conic curves at up to 800,000 pixels per second. Hardware also provides a 2K x 2K addressable area, rectangle fill, line texturing and high speed erase.

CONOGRAPHY™ for device independent graphics.

CONOGRAPHY is to curves what vectors are to straight lines. Using CONOGRAPHY, images are produced with less data. The result is faster image transmission, lower data storage requirements, fewer calculations, and device independent graphics.

Easy to install.

The CONO#GRAPH system is easy to add to your IBM PC. The CONO#COLOR Adapter substitutes for IBM's Color/Graphics adapter. The CONO#GEN module connects to the CONO#COLOR Adapter to provide added speed and processing capability. Both together fill a single expansion slot. And they're modular, so you can add color and resolution now and speed later.

Easy to use.

Efficient software makes graphic images simple to create. The CONO#GRAPH system supports the IBM graphics and character modes so that existing software runs without modification. And the CONO-LIB™ program provides an extensive library of subroutines for scaling, rotation, fill, image creation, labeling, recall, and more—under PC-DOS for BASIC, C, PASCAL, FORTRAN, or assembler. Future software will include CP/M-86 compatibility and sophisticated yet easy-to-use application programs.

From your mind's eye to the display screen with the speed and vivid color of thought itself. Ask your nearest IBM PC dealer for more information.

CONOGRAPHIC CORPORATION

2268 Golden Circle,
Newport Beach, CA 92660
714/650-2666

Dealer inquiries invited.

Reader Service #47

CONO#GRAPH, CONO#COLOR, CONO#GEN, CONOGRAPHY and CONO-LIB are trademarks of Conographic Corporation, Newport Beach, CA © 1983 Conographic Corporation.

Computer-Aided Design

Davis Straub

The market for drawing processors in 1983 has many similarities to the early battles between manufacturers of dedicated word processors and software firms providing generic word processing packages for a variety of microcomputers. Firms that are currently selling dedicated computer-aided design and drafting (CADD) systems for minicomputers are about to discover that they have a high-powered, low-end contender in the IBM PC. Compared to the minicomputer systems, the PC provides fewer CADD capabilities, but its lower price means widespread affordability.

The IBM PC is the new design standard for other microcomputers. A few farsighted CADD software manufacturers are taking advantage of the PC's higher level of standardization in graphics hardware as well as the advances in memory it offers. The three drawing processors reviewed here demonstrate the PC's impressive new role in computer-aided design.

Drawing processors will change the working styles of designers and draftspersons in the areas of architecture and civil, mechanical, electrical, and electronic engineering. Illustrators and artists will use drawing processors to develop flow charts, organizational diagrams, and other line drawings. In the near future, furniture manufacturers and model makers will show their creations in color and three dimensions on inexpensive computers in their clients' offices.

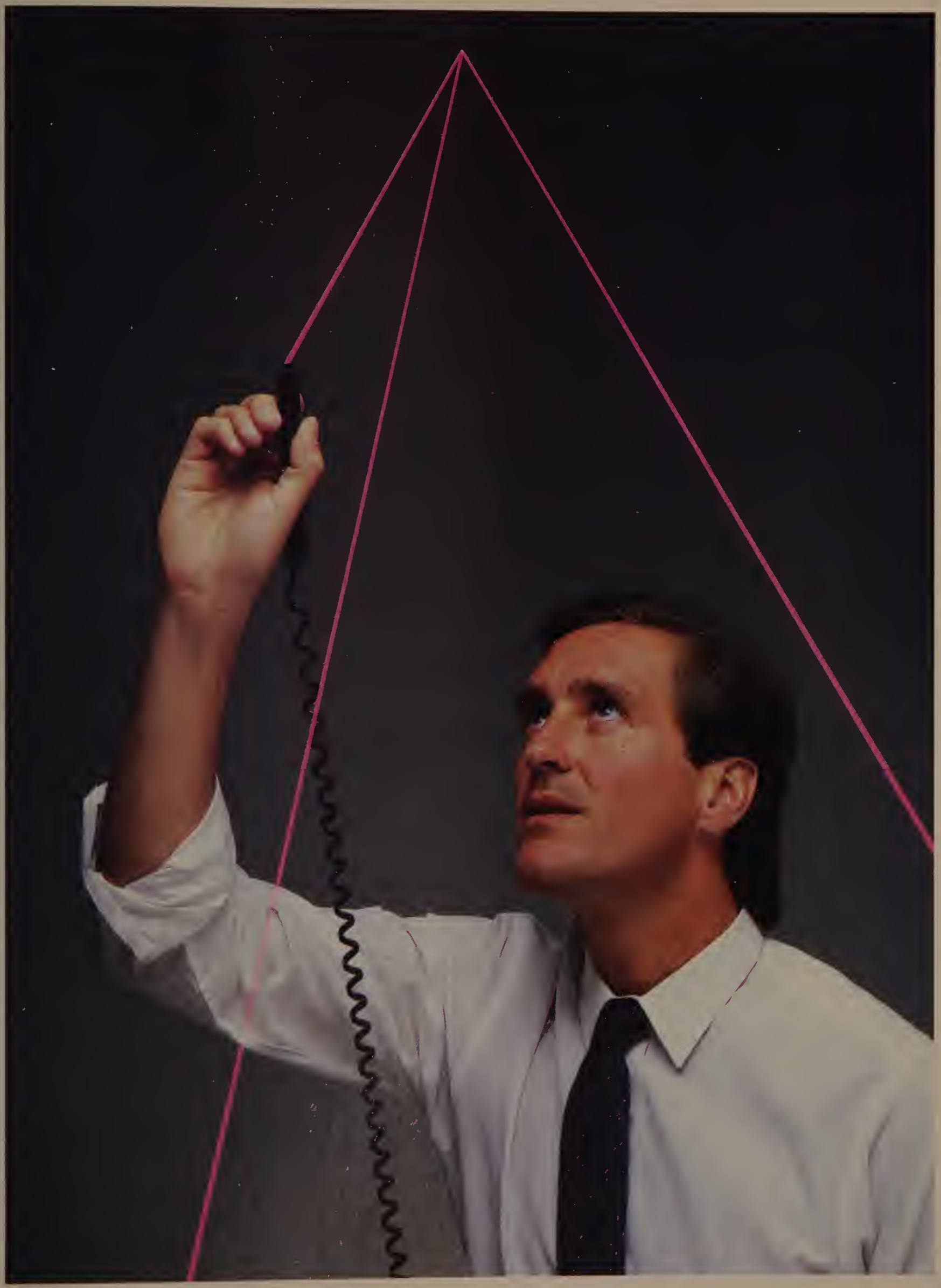
The primary uses of drawing processors are the creation, editing, and plotting of line drawings. Using color and filled-in solid figures allows for a wider range of expression. In some cases, numerical data can be plotted, though not as easily as with business graphics packages. Three-dimensional drawing processors allow perspective viewing of a designer's creation.

History Repeats Itself

The first word processing computers in the early 1970s were dedicated minicomputers with multiple users tied to one processor. Costs for such systems ranged from $100,000 to $300,000. Computer technology at that time was not ready to provide stand-alone single-user, single-processor systems. The current generation of CADD systems almost universally uses minicomputer hardware. The high cost of the hardware for these systems has limited their acceptance and thereby increased the software costs per unit delivered. These high initial costs have forced CADD manufacturers to add extensive capabilities to their software to improve marketability, further driving up the costs.

As was the case with word processing technology, the advent of the 8-bit microprocessor allowed some CADD manufacturers to develop lower priced ($80,000 to $100,000) dedicated single-user systems. But today you can choose from a few CADD programs running on 16-bit computers for $1000 or less. The cost of the peripherals required to enter and produce hard copy of the drawings brings the incremental cost above your existing PC to somewhere between $1000 and $32,000.

In a field that has seen few technological advances, the use of drawing processors on 16-bit machines will lead to an explosion in computer use similar to the success of word processing programs running on microcomputers. One study has predicted that 40,000 draftspersons will be out of work by the year 2000. On the other hand, some experienced people in the field of high-priced CADD systems believe that the way drafting work is done will change, but many people will still be needed to use the new tools.



● = Supported ● = Soon to be supported — = Not supported

	AutoCAD	The Drawing Processor	MicroCAD
Computer			
Columbia	●	—	—
COMPAQ	—	—	●
Compupro 816	●	—	—
DEC Professional	—	—	●
Digital Microsystems 16-bit work station	●	—	—
Eagle PC	●	●	●
Eagle 1600 series	—	●	—
Hewlett-Packard 86	—	—	●
IBM PC	●	●	●
NEC-APC	●	—	—
Texas Instruments PC	●	—	—
Victor 9000	●	—	●
Zenith Z-100	●	—	●
Screen			
color monitor[1]	●	—	●
monochrome monitor[2]	—	●	●
two monochrome monitors[2]	—	●	—
monochrome and color monitor[1]	●	—	●
Vectrix 384 color graphics board with monitor	●	—	—
Digitizer Pad			
GTCO	—	●	—
Hitachi Tiger	●	—	—
Houston Instruments HI-PAD	●	●	—
Summagraphics	—	—	●
Vectrix 384-1-3	●	—	—

(continues)

Table 1: Hardware for AutoCAD, The Drawing Processor, and MicroCAD

CADD on the PC

AutoCAD, *The Drawing Processor*, and *MicroCAD* are among the first design and drafting software available on 16-bit computers. With these tools the creation and editing of drawings that previously took weeks to finish by hand with dedicated equipment costing as much as $300,000 can now be done much faster on work stations costing from under $10,000 to $40,000.

The Drawing Processor and *AutoCAD* are similar packages. Both are two-dimensional line drawing and drafting packages that run on the PC and PC-compatible machines, including the Eagle PC and the Eagle 1600 series. They create any type of line drawing and can be used for architectural sketches and drafting, as well as electrical circuit design, mechanical design, interior design, line art for the fine arts, flow diagrams, and organizational charts.

Both *The Drawing Processor* and *AutoCAD* are generic line processors in the same sense that programs such as *WordStar* and *EasyWriter* are generic word processors. They allow the creation of almost any line representation but have been designed specifically for easy editing of drafting work. These products are less useful as free-form drawing tools for artists.

MicroCAD, on the other hand, is a three-dimensional drawing tool that is more useful for modeling and designing than for drafting. Like *The Drawing Processor* and *AutoCAD* it is a generic line processor, but *Micro-*

	AutoCAD	The Drawing Processor	MicroCAD
Other Input Devices			
keyboard	●	●	●
light pen[3]	—	—	●
mouse (USI Optomouse)	●	—	—
Touchpen (Sun-Flex)[4]	●	—	●
customized	—	—	●
Plotter			
Amdek DXY-100	—	—	●
Bausch & Lomb DMP-7	●	●	—
Bausch & Lomb DMP-8	●	●	—
Bausch & Lomb DMP-29	●	—	—
Bausch & Lomb DMP-40	●	●	●
Bausch & Lomb DMP-41	●	—	●
Bausch & Lomb DMP-42	●	—	●
Data Design Logic Systems	—	●	—
Hewlett-Packard 7220	●	●	—
Hewlett-Packard 7470	●	●	●
Hewlett-Packard 7580	●	●	●
Hewlett-Packard 7585	●	●	●
Sweet Pea	●	—	—
Printer			
Epson FX series	●	—	●
Epson MX series	●	●	●
Customized output device	—	—	●
Graphics Board			
Eagle Graphics Card	—	●	—
Hercules	●	—	●
IBM Color/Graphics Adapter	●	●	●
Orchid	—	—	●

[1]The manufacturers of *AutoCAD* and *MicroCAD* recommend using two monitors, though only one is required.

[2]The manufacturer of *The Drawing Processor* recommends using an Eagle PC with one monochrome monitor. Using an IBM PC requires two monitors.

[3]*MicroCAD* supports the FTG light pen.

[4]*MicroCAD* supports the Touchpen with the Victor 9000.

CAD also allows line drawings of solid (or *wire frame*) objects to be created, rotated, and viewed from a selected perspective. Line drawings of simple objects can be joined together to create more complex objects. Objects can also be defined by a mathematical function in *VisiCalc* and transferred to *MicroCAD* for plotting.

MicroCAD was available in the spring of 1982 and *AutoCAD* was first announced at the fall 1982 COMDEX show. As of early June 1983, Autodesk, Inc. had shipped 600 copies of *AutoCAD*, and Computer Aided Design had shipped over 350 copies of *MicroCAD*. *The Drawing Processor*, from startup company BG Graphics, was released on August 1, 1983 (a prerelease copy of the program was used for this review).

Hardware Shopping List

Drawing processors require devices that are beyond the configuration of peripherals normally associated with microcomputers. CADD systems are characterized by user interaction with digitizer pads, mice, light pens, screens, and a plotter. The role of the computer is to integrate all these devices. (See Table 1 for a comparison of hardware supported by the three programs reviewed here.)

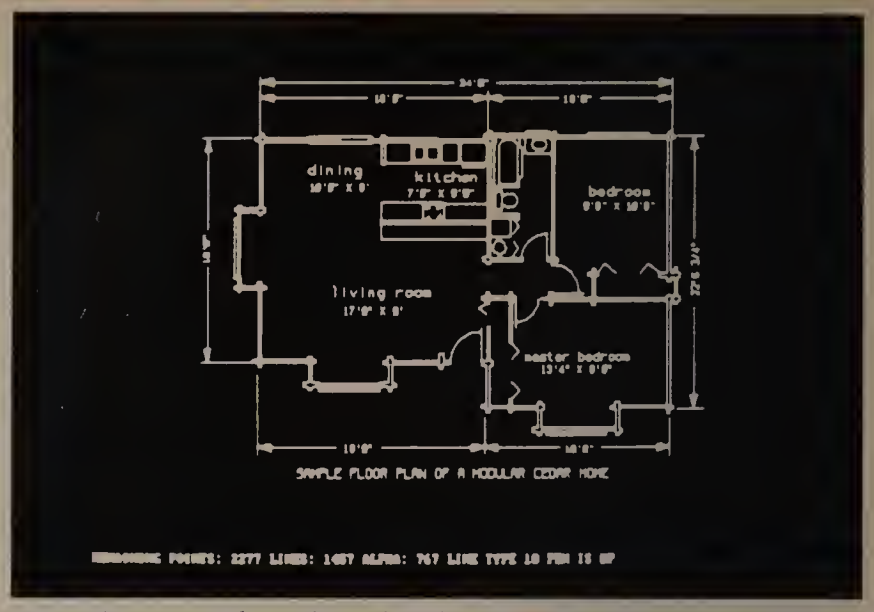
The crucial factors in determining how well users will adapt to the new CADD tools are the performance of the peripherals and how well the CADD software uses them. Performance requirements include being able to draw quickly and accurately. The drawing device should be as transparent as possible, meaning it shouldn't interfere with the job you have to do. The cursor location in the drawing must be clear at all times. Paper copies should be of a quality comparable to hand drawing, if not better. The computer, screen, and input devices must be located so as to provide a large, uncluttered work area.

All three systems encourage the use of two monitors, one for text commands and help messages and the other for graphics display.

All three tools support keyboard input for drawing, editing, and plotting. The prerelease version of *The Drawing Processor* required a digitizer pad for drawing creation, although the production version will also use the screen for drawing and editing. *AutoCAD* supports a Touchpen (Sun-Flex), a mouse (USI Optimouse), or a digitizer pad. *MicroCAD* supports a light pen and will soon support a digitizer pad. In any case, using a digitizer pad is preferable to using the screen as an input device because it provides a larger area for creating drawings.

All three systems encourage the use of two monitors, one for text commands and help messages and the other for graphics display. Single screen configurations are available with all of the systems, although *The Drawing Processor* requires two monochrome monitors with the IBM PC. With the Eagle 1600 or the Eagle PC, however, it requires one monitor. The Eagle PC and the IBM PC support the IBM Color/Graphics Adapter, which offers poor resolution quality.

The Drawing Processor also supports the Eagle board with mixed graphics and text on the same screen and 725- by 352-pixel resolution. *AutoCAD* can be run



Drawings produced with The Drawing Processor on the Eagle PC monochrome monitor

on one screen with the IBM Color/Graphics Adapter, but you must switch back and forth between text and graphics modes. *AutoCAD* also supports the Hercules Graphics Card with 640- by 400-pixel resolution. *MicroCAD* provides mixed graphics and text on one screen running on the IBM Color/Graphics Adapter, but two screens are preferable.

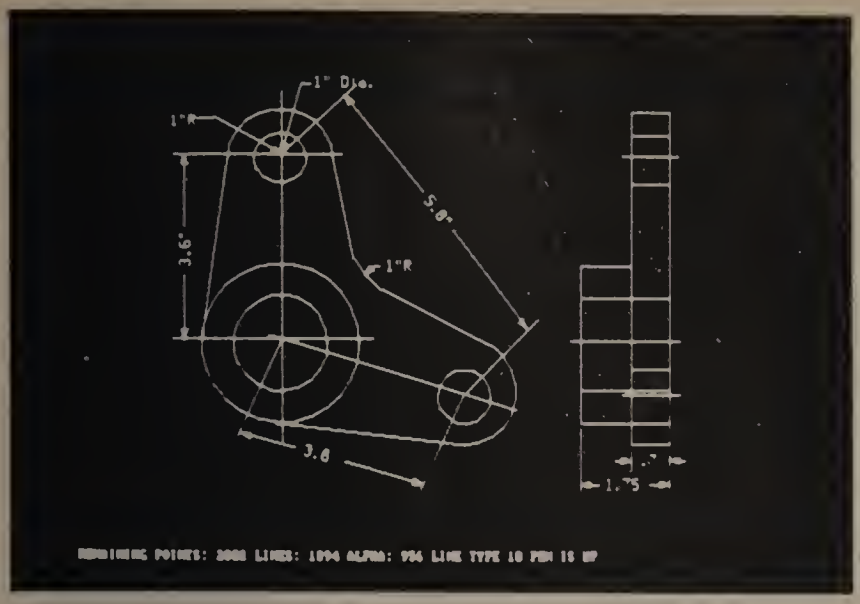
MicroCAD does not require the purchase of any input/output devices in addition to a monitor and a dot matrix printer. *The Drawing Processor* and *AutoCAD* both require the purchase of a plotter. *MicroCAD* supports a plotter as well as Epson MX series compatible printers. Using these printers is an option that allows a trade-off between quality and cost. Both *AutoCAD* and *The Drawing Processor* will soon support the Epson MX printers.

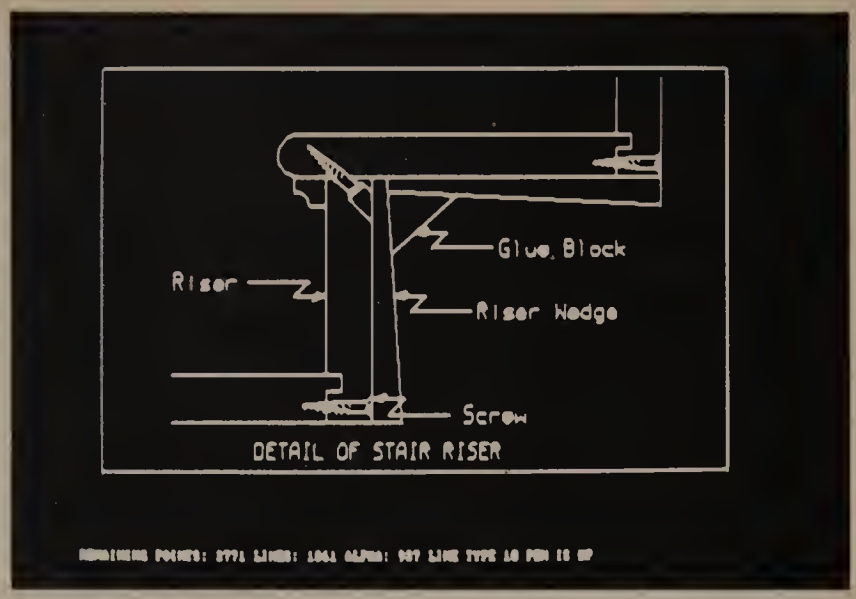
The Drawing Processor Work Station

A typical work station for *The Drawing Processor* includes an Eagle PC with an Eagle Monochrome Monitor and Monochrome Monitor Adapter Board for text and graphics display. Also included are a GTCO Digi-Pad; a 20- by 20-inch high-resolution digitizer pad and cursor



Typical work station for The Drawing Processor, which features the Eagle PC





(a handheld device that looks like a mouse); and an HP 7220C, an 11- by 17-inch single pen plotter.

The Drawing Processor prerelease version uses a digitizer pad as a drawing device. (As mentioned above, the production version will also use the screen.) The user first tapes blue-lined graph paper to the surface of the digitizer pad. A rough sketch is then placed on top of the graph paper. The digitizer pad is a 1-inch-thick square piece of white plastic, 24 inches on each side. Inside the plastic pad is a wire mesh that senses the location of the cursor when the user hits one of the cursor buttons. This particular digitizer pad has the ability to sense two points that are a thousandth of an inch apart; thus the resolution is 0.001 inch.

A menu of commands for *The Drawing Processor* software is fixed to the bottom of the active area of the digitizer pad. Although the pad is 24 inches square overall, only a 20-inch-square section contains the wire mesh necessary to sense the cursor's location. You select a command by placing the cross hairs of the cursor over the command on the digitizer's menu strip and pressing one of the cursor buttons.

You draw lines using the digitizer pad by placing the cursor over the rough drawing and pushing a button on the cursor at a specified point. The same button indicates "input command" either in the command menu strip or for drawing lines. Straight lines are drawn between the specified points on the screen. If you draw lines directly on screen instead of using the digitizer pad, you move the on-screen cursor with the keyboard cursor keys. You can also specify the absolute coordinates of the points and lines that you want to draw or edit on screen.

The Drawing Processor can create a hard copy of the drawing displayed on the screen. The digitizer menu command "Draw a picture" plots the drawing. The printed drawing looks the same as it does on the screen. As an alternative the drawing can be scaled and moved left, right, up, or down with respect to the lower-left corner (or any arbitrary point of origin) of the plotter surface.

You can edit the drawings on the screen by moving an on-screen cursor with either the keyboard cursor control keys or the digitizer pad's cursor. As the cursor moves about the screen it can draw a block around various parts of the drawing to be moved, or it can insert new components. The keyboard can be completely ignored when you use the digitizer pad.

PEN UP	CIRCLE ②	REMOVE LINE	GRID SIZE	DEFINE COMPONENT	ROTATE COMPONENT	MEASURE DISTANCE
	CIRCLE ③	MOVE POINT	TOLERANCE	PLACE COMPONENT	SCALE COMPONENT	MEASURE ANGLE
	ARC 3)	REMOVE LAST LINE	LINE TYPE	STORE COMPONENT	BLOCK COMPONENT	MEASURE AREA
	ARC 4)	BLOCK ERASE	CHANGE EXISTING LINE TYPE	RETRIEVE COMPONENT	STANDARD COMPONENT, 1" LINE	QUIT
	ELLIPSE	BLOCK MOVE	ORIGIN	STRETCH/SHRINK COMPONENT	STANDARD COMPONENT, ARROW	WINDOW
FAST LETTERING ON OFF	CURVE	SAVE	ALIGN	PLACE COMPONENT ON SCREEN	REMOVE LAST COMPONENT	DRAW PICTURE
A a B b C c D d E e F f G g H h I l U j K k L l M m N n O o P p Q q R r S s T t U u V v W w X x Y y Z z					LETTER SIZE / LETTER SLANT	ASPECT RATIO / LETTER DIRECTION
! 0 " 1 # 2 $ 3 % 4 & 5 ' 6 (7) 8 * 9 + : ; < = > ? @ [\ ] ^ ± ` { SPACE					BACK SPACE / RETURN	REMOVE SOME LETTERS

Plotted menu for The Drawing Processor

Review

AutoCAD Work Station

A typical *AutoCAD* work station does not require the use of a digitizer pad, although it can be used with a Houston Instruments HI-PAD or a Hitachi Tiger digitizer. Instead, *AutoCAD* uses the screen as its major drawing input device. Either a mouse, a Sun-Flex Touchpen, or a digitizer pad is used for controlling the on-screen cursor and for selecting commands from a menu appearing on the right side of the graphics screen. You can place the menu on the digitizer pad if you're using one. Drawings are created by moving the cursor on the screen to specify points and then drawing lines between these points.

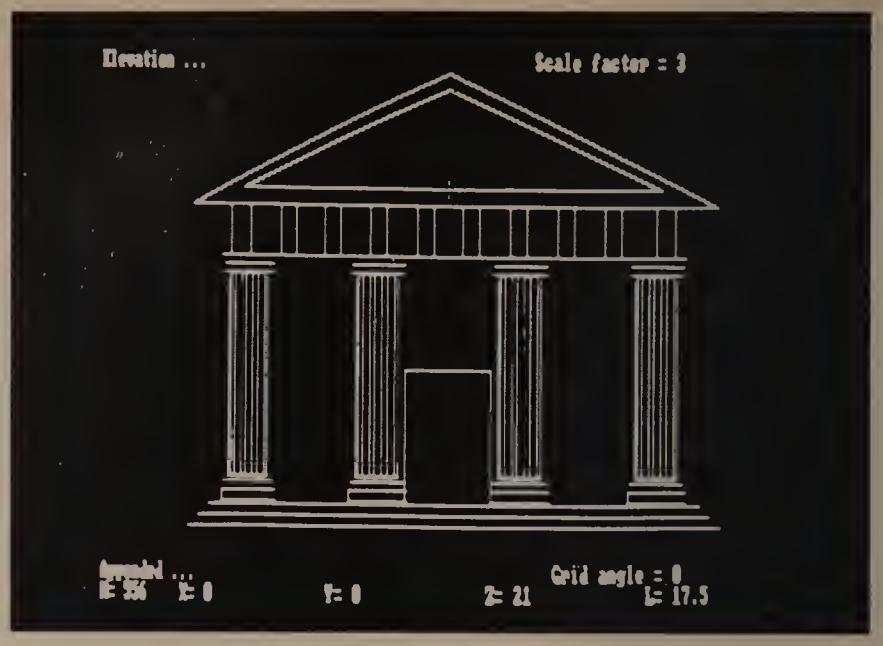
In using a Touchpen with *AutoCAD*, cross hairs appear on the screen and follow the Touchpen until you lift the pen from the screen surface to enter points or commands. A mouse is rolled around on a horizontal surface (usually a desk top) near the display screen while a cursor on the screen follows the relative movements of the mouse. You press a button on the mouse when you reach the point on the screen that you want to enter into the drawing. The digitizer pad and cursor can also be used as a pointing device (much like a mouse) with *AutoCAD*.

Points and lines can be placed on the screen by pointing with one of the input devices already described, using the keyboard cursor control keys, or by using the Line command with reference to the absolute or relative coordinate of the points and lines within the plane of the display screen. For example, you can draw a line between the lower-left corner of the screen and the middle of the screen by entering two points after the Line command, such as *0,0* and *5,5*. If the last point you entered using any of the input devices was *5,5*, then entering either *5,10; @0,5;* or *@5<90* (less than a 90 degree angle) after the Line command would draw a vertical line *5* units high from the starting point, *5,5*.

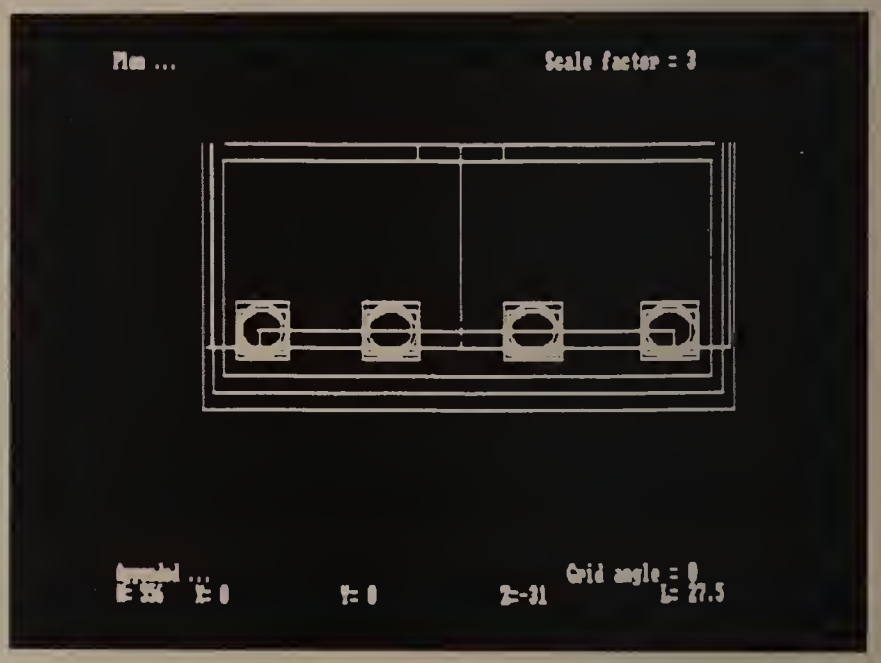
MicroCAD Work Station

MicroCAD uses the screen for drawing and editing, but you can only move the on-screen cursor by using the keyboard cursor keys or a light pen. The cursor is used to position points in a three-dimensional space. You enter points by pushing the period (.) key when the cursor is at the right location; you draw lines from the last point entered by using the backslash (\) key.

MicroCAD has a set of menus: a main menu for beginning new drawings, calling up and saving old drawings, and setting scales; an edit menu for entering lines and points, and rotating and viewing objects; a coordinate menu for entering points numerically (as opposed to spatially); and a plot menu for getting hard copy output. The function keys on the IBM PC or the Eagle PC are used to select menu items.



MicroCAD's elevation view



MicroCAD's plan view



MicroCAD's perspective view

The location of the cursor on the *MicroCAD* display screen is always specified by its X,Y,Z coordinates relative to the center of the screen. *MicroCAD* provides either *plan view* or *elevation view* of a three-dimensional object on a two-dimensional screen. In plan view (as in a floor plan) you view the object as though from above. The Y-axis is vertical and positive up from the center of the screen, and the X-axis is horizontal and positive to the right of the center of the screen. The Z-axis appears to come straight toward the viewer.

In elevation view, in which the object appears as if you were standing in front of it, the Z-axis is vertical, the X-axis is still horizontal and positive to the right of the center of the screen, and the Y-axis points into the plane of the screen, or away from the viewer. You can move the cursor about in either the X,Y plane or the X,Z plane using the cursor keys or the light pen, or you can locate the cursor at an absolute point by directly entering its X,Y,Z coordinates.

To draw a cube using *MicroCAD*, you first draw a square in one X,Y plane using the cursor keys, and the period and slash keys. You then change the Z-axis to the length of one side of the square and draw an identical square. The next step is to flip to the elevation view (press <F2>) and draw lines connecting the eight corners of the two squares.

Plan and elevation are isometric, not perspective, views of an object. This means that points on the object that are farther away appear to have the same dimensions as closer objects. To get a perspective view (how an object would look if viewed from a particular reference point a given distance away), you would locate the cursor at a given point and press the perspective key, <F3>.

Boilerplating a Drawing

If drawing processors only provided easy erasing and redrawing of lines, they would still be a major advance over the existing pencil-and-paper technology for drafting and sketching. In fact, CADD systems also have a number of other capabilities such as the ability to create, store, and retrieve *components* or *entities* that can be used repeatedly in a drawing. This is known as *boilerplating*. (See Table 2 for a comparison of boilerplating

Feature	AutoCAD	The Drawing Processor	MicroCAD
Applications	2-D architectural drafting; 2-D electrical circuit, mechanical, & interior design; 2-D line art; 2-D flow diagrams & organizational charts	2-D architectural drafting; 2-D electrical circuit, mechanical, & interior design; 2-D line art; 2-D flow diagrams & organizational charts	3-D architectural and interior drawing, modeling, & design
Boilerplating a drawing (creating, storing, & retrieving predefined components)	Line, circle, arc, trace*, solid*	Line, circle, arc, curve*, ellipses*	3-D objects*
Placing, rotating, & scaling components	Yes	Yes	Yes
Cutting and pasting	To move a component, identify it with one adjacent point	To move a component, draw a box around it; can move directly any portion of a drawing*	Can join 3-D objects
Rubber banding	Appended lines automatically stretched when moving a component within a defined window	Option to automatically stretch all appended lines when moving a component*	Can join 3-D objects
Adding text to a drawing	User chooses height of text	User defines size, slant, aspect ratio, angle, & placement of text	Two labeling modes

(continues)

Table 2: Features comparison for AutoCAD, The Drawing Processor, and MicroCAD

Feature	AutoCAD	The Drawing Processor	MicroCAD
Multi-layered drawings (2-D function)	Yes*	Define line types	No, but can overlay objects
Dimensions	Reports distance between points and dimensions for rectangular areas; optional semiautomatic capability*	Reports distance between points, dimensions for any closed polygon	Reports end point locations; need calculator to figure distance between points
Grids	Yes	Yes	Rotatable grids: plan and elevation views*
Orthogonal mode (2-D function)	Lines are forced to be vertical or horizontal	Can set tolerance; allows diagonal lines	No
Data storage format for writing auxiliary programs	Yes	No	Yes
Zoom	Yes	Yes	Yes
Foreign language	German; soon French and Swedish	No	No
8087 chip improves speed	Recommended	Required	Recommended
Programming language	C	Pascal MT+	Machine language

*Outstanding feature

Table 2: Features comparison for AutoCAD, The Drawing Processor, and MicroCAD *(continued)*

and other features of *AutoCAD, The Drawing Processor, and MicroCAD.*) While the major component of a drawing is a line, there are often other parts that can be defined by symbols and repeated throughout the drawing. For example, an architect can define a door frame or bathtub with an individual symbol and then enter the symbol to repeat this component in the same or future drawings.

AutoCAD provides a number of predefined components. In addition to line, they include circle, arc, trace (a fat line), and solid (a filled-in, closed area). In addition *AutoCAD* gives you the ability to quickly repeat any component as many times as you like in rows and columns.

The Drawing Processor includes lines, arcs, circles, ellipses, and curves (curves fitted to any series of points) as predefined components. Both programs allow you to create your own components from anything that you draw, store those components in a file, and retrieve them for use in a drawing.

Both *AutoCAD* and *The Drawing Processor* allow you to place, stretch, shrink, scale, and rotate any component. *AutoCAD* also gives you the ability to create new menus on the screen that can include the components, while *The Drawing Processor* allows you to add components to its menu strip.

MicroCAD allows you to create and store three-dimensional components, and to rotate, scale, and join them with an object on the screen.

Cutting, Pasting, and Rubber Banding

With all three systems you can move points as well as components, and erase lines and blocks (all the points and lines defined within a specified rectangular area). *AutoCAD* assumes that the components placed in a drawing retain their original identity. Therefore, you cannot remove any lines within a predefined component. To move a component you simply identify it with one adjacent point. *AutoCAD* allows you to move all the components and any lines appended to them within a

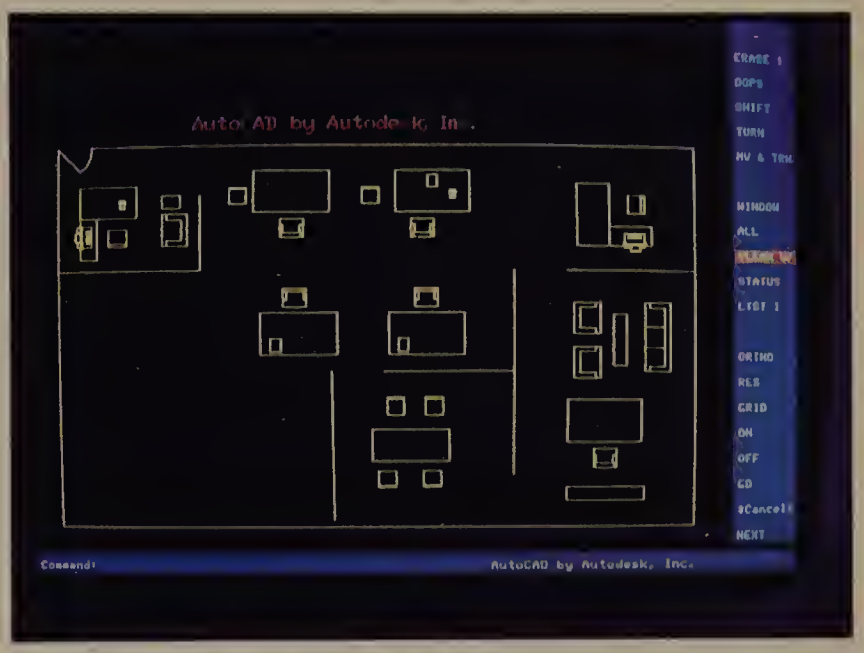
> Both *AutoCAD* and *The Drawing Processor* allow you to place, stretch, shrink, scale, and rotate any component.

window that is defined by its diagonally opposite corners. However, outside the window you must move separately each line that is attached to the component inside the window.

The Drawing Processor merges the points that define a component into the rest of the drawing, so you must draw a box around the area you want to move. As you move components, the program provides the option of having appended lines automatically stretched (*rubber banded*) to meet the components in their new location.

MicroCAD allows you to *paste* by sticking one three-dimensional object onto another, but there's no block move feature. Attached lines must be moved separately.





AutoCAD allows for moving all objects within the area defined by a window.

Adding Text Drawing

A drawing does not live by lines alone. If you are creating an architectural drawing, you'll need to put in a few clarifying words such as "living room" and "kitchen." All three programs have a facility for inserting text into a drawing. *AutoCAD* users can indicate the height of the text with the cursor or define the height numerically, angle the text, and create their own fonts (a procedure that requires inserting codes in particular byte locations). Text can be centered at a specified point instead of the normal left alignment.

The Drawing Processor lets you define the size, slant, aspect ratio (ratio of height to width), angle, and placement of the text. *MicroCAD* has two labeling modes. Text can be entered just before a drawing is plot-



When you move objects with AutoCAD, the rubberband cursor appears as a white line stretching from the starting point to the current location of the cursor. The line disappears once the second point is selected.

ted or, using an optional ($150) rotatable character set, the text can be viewed and plotted along with the image. In other words, in three-dimensional work the text is attached to any of the three planes, so the text will move or tilt as you tilt the image.

Multilayered Drawings

If you're drawing a six-layer circuit board or you want to view the titles separately from the drawing, with *AutoCAD* you can store the different pieces of information with separate layer designations. To get an idea of how this works, think of layers as sheets of transparent overlays. Colors that could be assigned to different colored pens on the plotter can be assigned to different layers. All of the layers can be plotted on the same drawing, or real transparent overlays can be created when you plot the drawing.

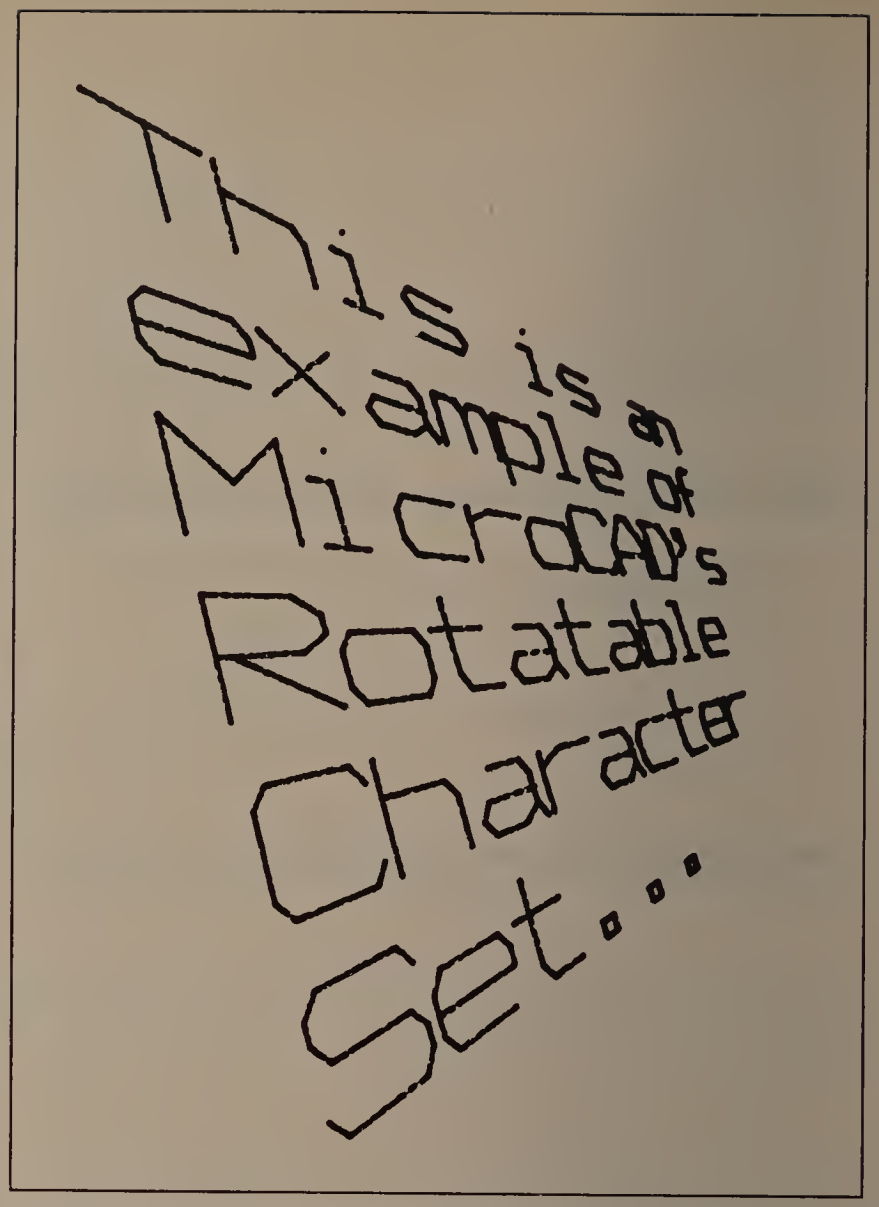
The Drawing Processor has a more limited capability that allows for the definition of different types of lines.

The Drawing Processor has a more limited capability that allows for the definition of different types of lines. Different color pens as well as dashed or other types of nonsolid lines can be designated. The manufacturer plans to provide a layering capability similar to *AutoCAD*'s. *MicroCAD* doesn't have layering or line definition capabilities.

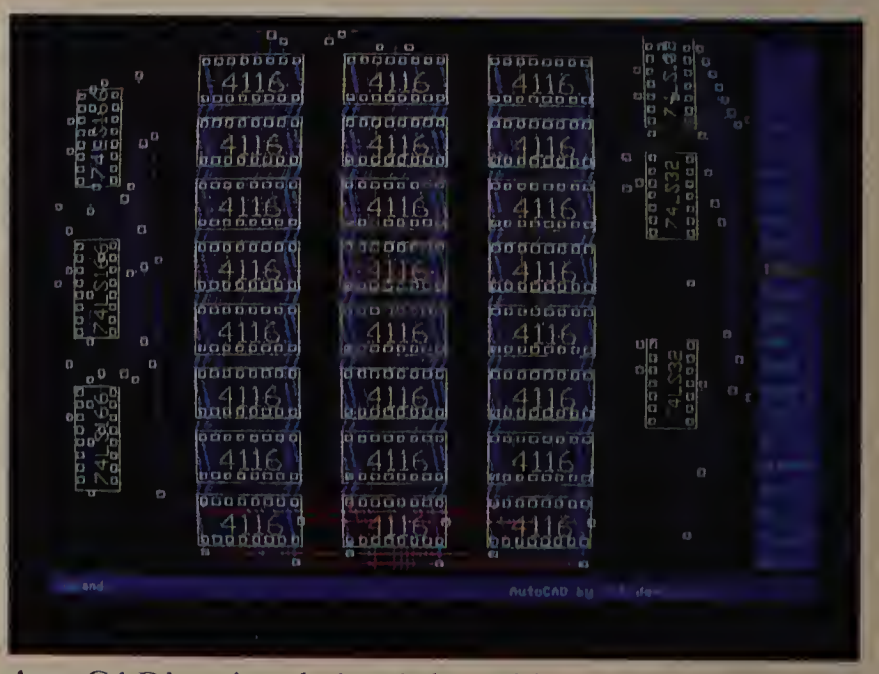
Dimensions

Each of the three programs keeps track of the relative position of points in a drawing. By using this information you can determine the various distances between points.

AutoCAD will compute the distance between two points and the area enclosed by a set of points. It also offers a semiautomatic dimensioning capability at additional cost ($500). You designate where you want the dimension lines and the extension lines (which designate the end points of a dimension line). The distance is then



Using MicroCAD's optional feature, the rotatable character set, text can be viewed and plotted both with and without a three-dimensional image.



AutoCAD's printed circuit board layout







AutoCAD's multilayering feature permits drawing overlays. (Note: The AutoCAD screen photos all show graphics on the Vectrix 384 color monitor. The menu always appears on the right side of the screen.)

determined and appears as a decimal number in its proper place on the dimension line. Arrowheads are automatically drawn on the dimension line and placed inside or outside the extension lines as specified.

The Drawing Processor will report the distance between points or along any set of points, the area enclosed by a set of points, or the angle between two lines.

MicroCAD provides the locations of the end points in your drawing. You can then use a calculator to determine the distances between points.

Grids, Orthogonality, and Tolerance

Even with a grid to mark lines, drawing vertical or horizontal lines is not always easy. By setting the grid size you can make lines snap to the grid if they are less than halfway to the next grid line. Drawing can be done much faster because you don't have to be so careful. *MicroCAD* provides for two rotatable "graph paper" grids on the screen, one in plan view and one in elevation.

While all three programs have a grid capability. *AutoCAD* also has an orthogonal mode. This means that all lines less than a 45-degree angle must be horizontal and lines greater than a 45-degree angle must be vertical. Unlike *AutoCAD, The Drawing Processor* allows you to set a tolerance for drawing horizontal and vertical lines.

Data Storage Format

Autodesk (*AutoCAD*) and Computer Aided Design (*MicroCAD*) have published the format for information exchange between their programs and other programs. The format consists of ASCII text files that can be written by other programs or used as the input to customized programs. With *MicroCAD*, for example, you can determine a bill of materials and costing information from the components in a drawing. *MicroCAD* also lets you define an object in a *VisiCalc* worksheet, save it as a DIF (data interchange format) file, and then convert it to a file that *MicroCAD* can read.

Physical Limitations

Without the aid of a drawing processor, you would begin a drawing by deciding what size paper you are going to use. The paper size will help determine the scale of your drawing (what distance in your drawing represents a given distance in the real-world object). After that decision you tape down the paper and get out a T-square, a french curve, a set of triangles, a pencil, and an eraser.

In using a drawing processor, the size of your drawing (the hard copy plot) is not limited by the size of the input device. Whether you use a digitizer pad or the

screen for drawing, you can plot a drawing up to the size of the plotter or divide the drawings up and plot one section at a time. The scale can be determined at the time of plotting. The complexity of a drawing is limited only by the software and hardware memory capabilities.

Although the input devices (graphics screen and digitizer pad) and plotter do not limit the size of the final hard copy of the drawing, the input devices do limit the size of the area in which you create and edit a drawing. For example, *AutoCAD* provides an approximate area of 7 inches horizontally and 4 inches vertically within which you can draw on the screen. If you create a drawing that will be 24 by 36 inches in its final hard copy form, the screen could get somewhat crowded. The same problem applies to *MicroCAD* and *The Drawing Processor* when the screen is used. For large drafting jobs using the screen can be a real drawback because of the small input area and low resolution.

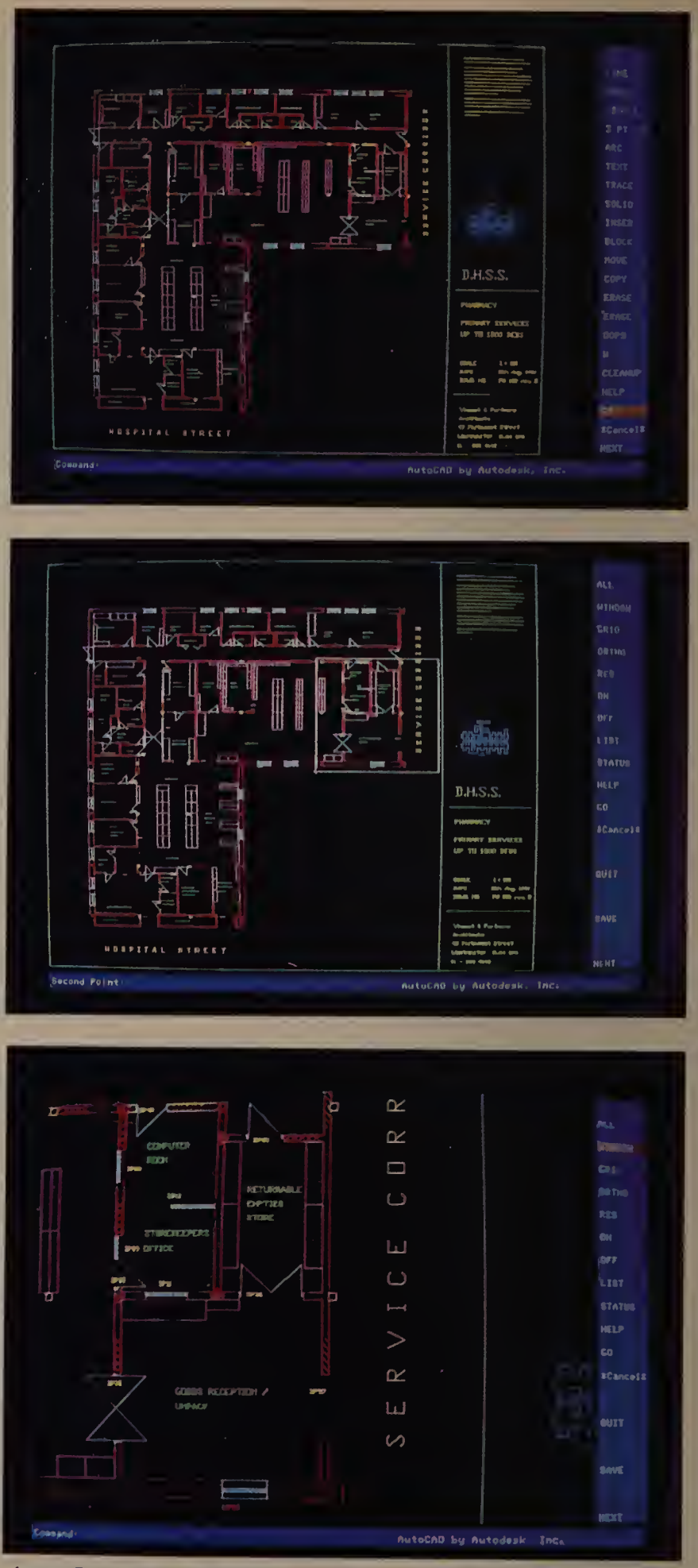
The size of the digitizer pad is also limited, but using this device is preferable to constantly looking at a small screen. The drawback to using the digitizer with *AutoCAD* in Tablet mode is that no reference cursor is on the screen to indicate your location. However, if you use the digitizer as a pointing device instead of in Tablet mode, a reference cursor does appear on screen.

The Drawing Processor's 20-inch square digitizer pad has a menu strip, so you have 20 inches horizontally and 16 inches vertically within which to place your drawing. The size of the digitizer pad is not limited by the size of the screen. Even if the digitizer pad were as large as a standard drawing table—the ideal size—the whole drawing could still fit onto the tiny 8- by 5½-inch screen.

Zoom Feature

The ability to *zoom* (or *window*) in or out from a given part of the drawing area partially overcomes the physical limitations of the screen size. *AutoCAD* initially asks for the size of the drawing in arbitrary units. The drawing then takes up the input area of the screen. If you draw an object within a small section of the input area, you can zoom in on the object and make that section fill the drawing area. This feature allows you to zoom in on the same object several times, increasing the magnification each time.

Alternatively, after drawing an object such as a chair, using the full screen you can zoom out to place the object within a small area of the final drawing on screen. Once the drawing is plotted at a large scale the object will again be viewed easily, even if it only appeared in a



AutoCAD's zoom feature allows enlargement of a selected area of a drawing.

small area while on the screen. The zoom capability is limited only by the precision with which the coordinates of the points within the drawing area are stored. All three programs provide sufficient zooming capability for any practical applications.

In using *The Drawing Processor*'s digitizer pad, any section of the active area can be seen on the screen. You specify a lower-left and an upper-right point and then give the window command on the digitizer command menu.

Resolution Quality

Screens, digitizer pads, and plotters are not only limited in their size but also in their resolution (the ability to differentiate between two closely spaced points). Greater resolution on the screen provides more aesthetically pleasing graphics images and more accurate placement of the points within the drawing. Digitizer pads with high resolution allow greater accuracy in placement of points within the drawing and finer drawings on a small surface. Plotters have inherent resolutions determined by the accuracy of their stepper motors, the size of their pens, and the quality of their mechanisms. High-quality plotters can place drawings with more detail in smaller areas.

Although zooming helps to overcome the limitations of screen size, it doesn't eliminate the problem of inadequate screen resolution. Imagine that you want to draw two lines that represent pipes, which are to be 1/20 inch apart and 18 inches long when finally plotted. Because of the relatively poor screen resolution, the two lines may appear as one line. To correct this problem you can zoom in on a small area and easily separate the two lines on the screen with a window that represents a 5-inch square. However, you would have to repeat this procedure four times to draw lines that are 18 inches long.

The quality of a graphics representation on screen is determined by the density of pixels (the dots on a video screen). The IBM Color/Graphics Adapter, which all three programs support, provides resolution too poor for an adequate graphics display. It supports 640 by 200 pixels on a screen area of 8¾ by 6¼ inches, for a density of 73 pixels per inch horizontally by 32 pixels per inch vertically. Higher resolution boards can support densities of 85 pixels per inch horizontally by 60 pixels per inch vertically.

AutoCAD also supports the Hercules Graphics Card and the Vectrix 384 color graphics system; both of these provide twice the pixel density (resolution) of the IBM Color/Graphics Adapter. *AutoCAD* overcomes some of the screen resolution problems by allowing you to specify the absolute coordinates of a point or a line.

The Drawing Processor supports the Eagle monochrome board at twice the density of the IBM Color/Graphics Adapter's resolution. As with *AutoCAD*, you can partially overcome poor screen resolution by specifying the absolute coordinates of a point or line. When used with a high-resolution digitizer pad, *The Drawing Processor* is independent of the screen resolution.

MicroCAD supports the Hercules and Orchid graphics boards. The Hercules board supports 720 by 348 pixels and the Orchid board supports 720 by 350 pixels. The manufacturer points out that from a cost/performance standpoint the IBM board is satisfactory, especially considering its cheaper price.

Evaluation

MicroCAD works well as an inexpensive drawing and design tool, but it has limited applications. I would recommend this program if important criteria for your project are using three dimensions and being able to easily manipulate a drawing for viewing from selected perspectives. Consider, though, that *MicroCAD* is not primarily a drafting tool, so it does not have all the easy creating or editing features of *AutoCAD* and *The Drawing Processor.*

> The ability to *zoom* (or *window*) in or out from a given part of the drawing area partially overcomes the physical limitations of the screen size.

Architects may prefer *MicroCAD* to the other two programs specifically for creating and representing their ideas to clients. This is a qualified recommendation, however, because *MicroCAD* provides only wire-frame graphics (line drawings of a solid object) with no hidden-line removal. Without this feature you can't identify whether lines in a three-dimensional drawing are in the foreground or background. The manufacturer plans to provide this feature but has postponed implementation until the quality is assured.

An interior designer might use *MicroCAD* to present more realistic, three-dimensional models to clients. For example, a furniture manufacturer is using *MicroCAD* to send model drawings to customers.

Review

In summary, *MicroCAD* has advantages for architects and interior designers that the other two programs don't have. These are perspective viewing, the ability to join three-dimensional work objects on the screen, and the support of auxiliary programs that you may write for any purpose, such as figuring a bill of materials. Most importantly, although *MicroCAD* has limited capabilities compared to the minicomputer CADD systems, it is affordable for the average PC user.

My major problem with *MicroCAD* is its reliance on the screen as the sole drawing device. This complaint is aimed more at present technology than at the program itself. For three-dimensional work, the screen is more practical than a digitizer pad as a drawing device. The only cure for eyestrain and poor resolution would be a larger screen and a graphics board better than IBM's. *MicroCAD*'s minor drawback is that it doesn't do solids or shadings for more realistic drawings.

Compared to *AutoCAD*'s many input options, *MicroCAD* supports only two devices: the keyboard and a light pen. Using the keyboard is preferable to using a light pen. Holding a light pen for an extended period is uncomfortable, and entering points with the light pen is less accurate than with the cursor keys because you have to hold the pen steady. The one advantage of the light pen is that it is faster than the cursor keys because you can go from point to point in fewer steps.

AutoCAD and *The Drawing Processor* are similar, both being two-dimensional drafting and design tools, but *AutoCAD* has some unique features. Architects will appreciate its semiautomatic dimensioning capability; interior designers, its ability to draw solids and traces (fat lines); and electronic engineers, its layering capability. Like *MicroCAD*, the data base format is available so you can write your own auxiliary programs. *AutoCAD* supports a mouse, which is an advantage if that's the input device you prefer.

The only limitation of *AutoCAD* is that the screen is the major drawing device. You can probably overcome the problems of poor screen resolution and eyestrain by using a digitizer pad in Tablet mode, a large plotter, and check drawings taped to the digitizer pad.

For drawing and editing, *The Drawing Processor* is as easy to use as *AutoCAD*. Its unique features are complex curves, ellipses, the ability to move any point within a component directly, and the rubber banding of lines to components as these are shifted about the drawing.

The bottom line in evaluating similar products is deciding which product you prefer to use. I would choose *The Drawing Processor* over *AutoCAD* for one reason: it fully supports a digitizer pad as a drawing device. Although you can use a digitizer pad with *AutoCAD*, it doesn't support all capabilities. As previously discussed, in Tablet mode there is no reference cursor on screen. When the digitizer pad is used as a pointing device, it moves only the on-screen cursor and can't be used as a drawing device.

I only wish *The Drawing Processor* had *AutoCAD*'s ability to draw solids and do semiautomatic dimensioning. But even without this capability I still prefer *The Drawing Processor* over *AutoCAD* because full use of the digitizer pad is a more important feature.

Davis Straub is a systems consultant with the First Charter Corporation in Bellevue, Washington. He currently markets a UCSD p-System-based energy analysis program and packages computer systems for architects and engineers.

AutoCAD
Autodesk, Inc.
150 Shoreline Highway #B20
Mill Valley, CA 94941
List Price: $1000, dimensioning capability $500, manual and demo disk $50
Requirements: 192K, two disk drives, color monitor, color graphics board

The Drawing Processor
BG Graphics
824 Stetson Ave.
Kent, WA 98031
206/852-2736
List Price: $995
Requirements: 256K, two disk drives, 8087 co-processor, two monochrome monitors with the IBM PC, IBM Color/Graphics Adapter

MicroCAD
Computer Aided Design
764 24th Ave.
San Francisco, CA 94121
415/387-0263, 386-7881
List Price: $500, $150 rotatable character set, $160 FT6 light pen
Requirements: 128K (64K disk also included with program), two single-sided disk drives (or one double-sided disk drive), color graphics board

The birth of a new era in software.



Introducing THE CREATOR.™

First came hardware.
Then came software.
Now there has emerged the new era in software. It's called THE CREATOR.™

THE CREATOR is so powerful, so versatile, yet so simple to use, you should learn about its ability to do your work even before you choose a personal computer.

And if you do own a computer, THE CREATOR is the way to get more done in less time for less money than you ever could with conventional software.

THE CREATOR. It could be the only piece of software you'll ever need.

Why? Because without knowing anything about computer programming or computer language, you can use THE CREATOR—one piece of software—to do a multitude of jobs.

For example, wouldn't it be nice to compose a letter in ten minutes or less? THE CREATOR's Word Processing routine helps you do it. Its General Ledger routine helps you see if your business is in the red or the black—and why. Data Base Management gets you information faster and in considerably less space than a traditional filing system. Financial Planning helps you see where you'll be financially in a day, a month, a year from now, in seconds. Checkbook helps you do something you may have thought to be impossible—balance a checkbook. Bar Charting converts dull numbers into pictures. And you can even compose music with THE CREATOR's Musical Composition * routine.



Plus, you can create programs for your Mailing Lists, Invoicing, Accounts Receivable, and more. Best of all, once you create these programs, each is on its own diskette. And exclusively yours.

THE CREATOR speaks English.

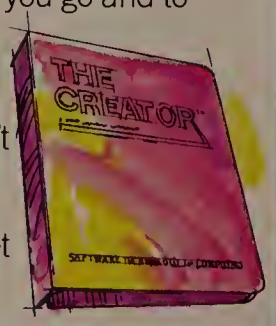
If you've tried to read an instruction manual in BASIC computer language, you've probably been frustrated and confused. And your computer doesn't do you any good when you can't figure out how to use it.

THE CREATOR is the simple solution to this failure to communicate. You speak English to it. And it speaks English back to you. It acts as your interpretor—the link between you and your personal computer. So don't worry about learning a computer language. You simply don't need it when you use THE CREATOR.

Plus, it's simple to operate. Just insert THE CREATOR's diskette into your computer's disk drive and you're ready to go. Step by step, it takes you through simple questions. Then you respond as you tell THE CREATOR what job you want to do and how you want to do it. And then it does it.

Of course, we realize that even the best of us can slip up. So THE CREATOR has built-in instructions to help keep you on the right track.

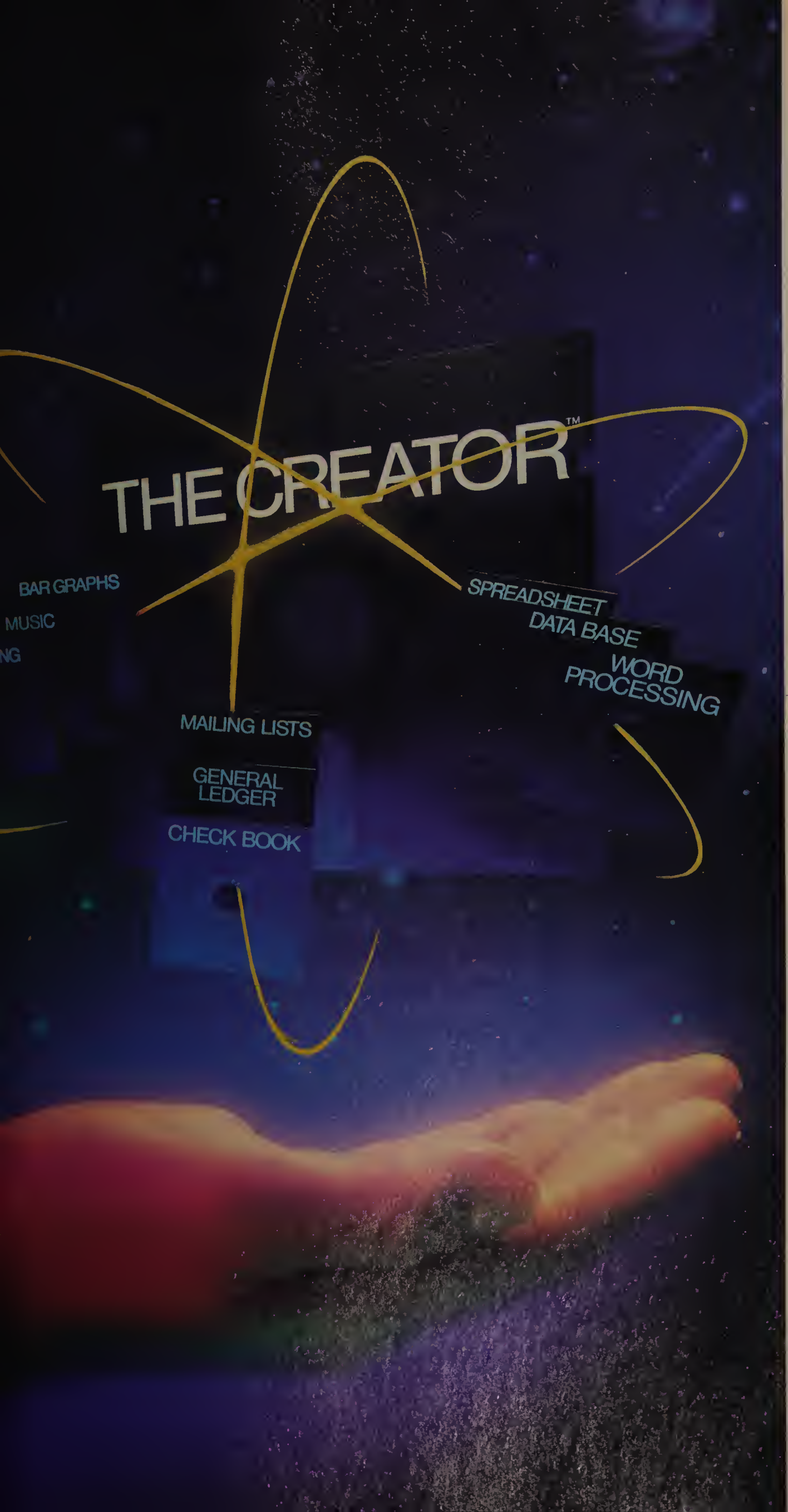
Plus, THE CREATOR comes with a carefully written, easy-to-use manual to answer your questions as you go and to check your progress. And remember: you don't need to read the entire manual to get started.



It's simple to create your own unique applications.

What really makes THE CREATOR unique is that it allows you to create your own customized applications to fit your professional, personal, and educational needs. It gives you the freedom to get work done your way. So there's no more confusion about what software

The simplest way to get the most out of your computer.



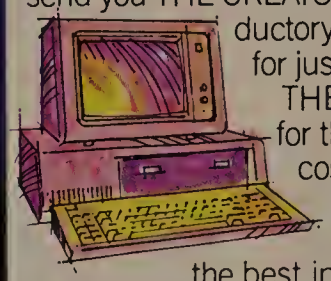
to buy. No more frustration with complex computer language. No more unnecessary software expense. No more wasted time.

That's what THE CREATOR—the new era in software—can mean for you.

It's simple to experience the new era.

THE CREATOR is available right now at all personal computer outlets. Stop by and ask to see just how easy it is to use and how much it can do.

Or simply fill out the attached coupon, send it to us, and we'll send you THE CREATOR's Introductory Diskette for just $3.50.



THE CREATOR for the IBM PC costs only $300.** It could be the best investment you'll ever make, considering that separate pieces of software could cost several times more.

The new era of software is here. Shouldn't you make the most of it?

THE CREATOR™

The new era in software.

I want to enter the new era.

Enclosed is my $3.50 for the Introductory Demo Diskette. Please send me the following version:

- ☐ IBM PC version
- ☐ Apple II version
- ☐ COMPAQ version

Name _____

Address _____

City _____

State _____ Zip _____ PC

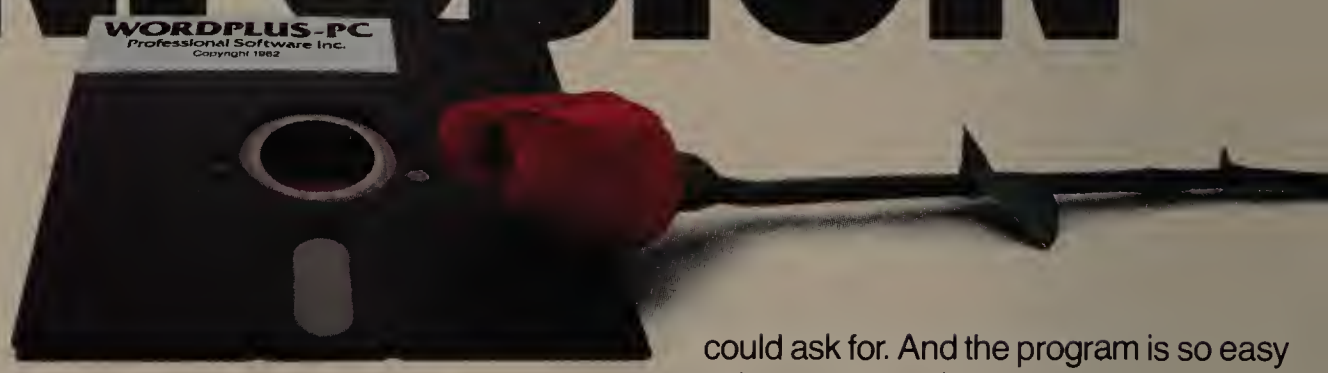
Software Technology for Computers, Inc.

153 California Street, Newton, MA 02158
(617) 244-2590

*Features may vary from computer to computer.
**Apple II version, $250. COMPAQ version, $300. Versions for other other computers available soon.

THE CREATOR is a trademark of Software Technology for Computers, Inc.
Apple is a trademark of Apple Computer Co.
IBM is a trademark of International Business Machines Corporation.
COMPAQ is a trademark of COMPAQ Computer Corporation.

ANNOUNCING THE END OF WORD PROCESSOR CONFUSION



It's one confusing business, choosing a word processor. All those companies assuring you theirs is the most fantastic one of all. And leaving you to cut through all the smoke and hopefully whittle them down to the best one for you.

Well, we can help. If you'll just invest the next three minutes reading this, we'll tell you about a word processor that makes picking the right one a real breeze.

FIRST, A WARNING. There are two things you must do when evaluating any word processor. First, be careful. It's no secret that many of today's claims about being easy to learn and use just don't stand up to careful comparison. Watch carefully for complicated codes and programs that require "training sessions." Secondly, be selective. Buy a word processor you can use on a daily basis, not one that requires another "training session" when someone goes on vacation. In other words, be very careful to select the word processor that's absolutely the best and easiest to use. Which is what we'll now introduce you to.

WHY ONE WORD PROCESSOR MAKES THE MOST SENSE OF THEM ALL. Meet WordPlus-PC. It's the advanced, "user-oriented" software package that turns your IBM-PC computer into a word processor equipped with the sophisticated capabilities of far larger, more expensive systems.

THE REMARKABLE WORDPLUS-PC STORY. In a nutshell, it's this. WordPlus-PC was designed from the ground up to be the very latest in word processing technology. It has all the important features you could ask for. And the program is so easy to learn and use it defies comparison with other software.

HOW WE CAN BE SO SURE OF OURSELVES. We're Professional Software, a leader in word processing software with over 30,000 customers contentedly churning out letters and documents around the world on personal and business computer systems. We know precisely what a top quality word processor must do. And we've studied all the shortcomings of our competitors. That's how WordPlus-PC came to be the easiest-to-use word processor ever.

ALL THE FEATURES YOU'D EXPECT.



WordPlus-PC is both powerful and versatile. Its long list of major functions includes movement of paragraphs, global search-and-replace, and creation of multiple "boilerplate" and personal letters with the touch of a few buttons. There are 3-line headers and footers and automatic page numbering. When you underline or boldface words as you type, WordPlus-PC displays them in that form on the screen. You can merge information created by popular spread sheet programs. You'll create personal letters quickly and easily, or merge name and address information from other programs. You can easily create standard layouts for preprinted forms and use WordPlus-PC to prepare invoices or quotations. For large corporate customers, WordPlus-PC has the capability to merge information from files created by the firm's mini or mainframe computer. You can even type new documents while the system is printing other ones. And you'll find WordPlus fully compatible with virtually all popular ASCII letter-quality and dot matrix printers.

A BREEZE TO LEARN AND USE.

With WordPlus-PC's easy-to-use documentation, you'll be using your word processor right from the first minute. After an hour, you'll feel at home with all the basic functions and ready to explore the more sophisticated ones. After a few hours you'll put the manual away. There are never any complicated or confusing codes to memorize or look up. Rather, the screen's "message area" reminds you how to do what you want. WordPlus-PC's unique keyboard color coding makes things even easier. And whenever there's a question, simply press the HELP function to get back on track.

ALL THE HELP YOU NEED VIA TOLL-FREE PHONE.

Learning something new goes best when you have encouragement, reassurance and answers to questions. That's how WordPlus-PC helps you learn. In addition to the help you'll get from your dealer, we're ready to assist you when you call our special toll-free number and talk to one of our carefully trained advisors. This service is available at no charge during the 90 days following receipt of your user registration card. It's all part of Professional Software's total commitment to customer service and support.

SEE WORDPLUS-PC FOR YOURSELF AT YOUR COMPUTER DEALER.

Call us today. We'll answer all your questions. And we'll give you the name of the Professional Software dealership nearest you. Then go witness WordPlus-PC in action. Because once you're sitting in front of WordPlus-PC you'll quickly see where all our confidence and enthusiasm come from. After all, you already own the best personal computer. The best word processor is only $395. So call us today.

GUARANTEE

Professional Software Inc. guarantees its WordPlus-PC customers:

1. Free telephone assistance for 90 days after receipt of customer registration card.
2. Free updated program diskette if any software improvements are made within 90 days of purchase.

CALL US TOLL FREE:
1-800-343-4074

Professional Software Inc.

51 Fremont Street, Needham, MA 02194 Telephone (617) 444-5224

Dealer, distributor, OEM manufacturer, and corporate inquiries are invited. Call us at (617) 444-5224.
WordPlus-PC is a trademark of Professional Software Inc.
Specifications are subject to change without notice.
WordPlus-PC was designed and written by Andres Escallon.

Reader Service #145

Stretching VisiCalc

StretchCalc brings a new face to the spreadbase race.

Edwin T. Moore



When Lotus Development Corporation released *1-2-3* in January 1983, it signaled a new level of integration for applications software. *1-2-3* combined spreadsheet, data management, and graphics into a new type of program, a "spreadbase." For several months the trade journals have reported that sales of *1-2-3* have surpassed the industry-standard spreadsheet, *VisiCalc* from VisiCorp.

Multisoft Corporation, a Beaverton, Oregon, startup company, has made the race much more interesting with the introduction of *StretchCalc.* Described by its developer, Bruce Schaefer, as a "turbocharger" for *VisiCalc, StretchCalc* brings to *VisiCalc* some of the same graphics, data management, and spreadsheet enhancement features now associated with *1-2-3*. This article will try to answer the obvious questions: Is *VisiCalc* with *StretchCalc* as good as (or even better than) *1-2-3?* Does *StretchCalc* really have all of *1-2-3*'s data management and graphics features?

Starting Up

One difference between the two systems is obvious from the start: *1-2-3* is a complete program that can be loaded with one simple command. It does require, however, at least two disk drives. Due to the more than

200 help screens that occupy about 177K of disk space, the *1-2-3* system disk must remain in drive A throughout a working session. Release 1 of *1-2-3* together with DOS 1.10 takes only 99K of internal memory. Release 1A with DOS 1.10 uses about 102K, and Release 1A with DOS 2.00 takes 114K. Since *StretchCalc* is an add-on to *VisiCalc*, it requires more disk swapping to load, but the *StretchCalc* disk can be removed from the drive after it has been loaded, freeing the drive for working files. *StretchCalc* combined with *VisiCalc* takes up 103K of internal memory.

1-2-3 is a far more complex program than *VisiCalc* or *StretchCalc*, and considerably more time is required to master all of its features. Previous experience with *VisiCalc* is helpful in getting started, but for people without experience Lotus has provided learning aids.

The fastest way to get acquainted with *1-2-3* is to use the on-screen tutorial. In 2 to 3 hours you can sample many of the program's features. Unfortunately, the language and tone of this tutorial are not in keeping with the high quality of the program.

Pressing <F1> at any time during a *1-2-3* session produces a help screen related to the current position in the program. The cursor can be moved within a help screen to select other help screens or to select the help index. The <Esc> key returns control to the program.

The *1-2-3 User's Manual* is well written and organized. Despite many other learning aids, studying the manual is still the best way to gain an understanding of the program. In many instances the manual may be faster than the help screens for finding references.

The *StretchCalc Reference Manual* is clearly written and is intended to be used as a supplement to the *VisiCalc User's Guide*. Because the heading on each page indicates the command being discussed, information on any specific command is easy to locate. Every command description includes a flow chart describing how the command is used and detailing the available options. Following the flow chart is a discussion of how to specify the values of the cell ranges or options. The final section for each command provides an example of how to use it.

StretchCalc's documentation is readable and well laid out, despite the fact that it was created on an Epson dot matrix printer and photographically reduced. Although *StretchCalc* itself is easy to understand and use, it doesn't add help screens or improve *VisiCalc*'s barebones command menu line. *1-2-3* is easier for a spreadsheet novice to learn, but for an experienced *VisiCalc* user, *StretchCalc* will provide no obstacles.

Command Structure

1-2-3 uses a complicated, multilevel command structure. Seven pages of the *1-2-3 User's Manual* index are devoted to listing more than 200 command possibilities; these are arranged in command trees with as many as six levels. Some of the commands on the main menu lead to submenus, which may in turn lead to other submenus, and so forth. While this tree structure provides the key to utilizing many additional features, it also means that in many cases more keystrokes are needed to accomplish a given function. For example, to clear a *VisiCalc* or *StretchCalc* worksheet you type /CY . To clear a *1-2-3* worksheet you type /WEY . However, some operations, such as /Range Move, can be accomplished with fewer keystrokes in *1-2-3*.

The two-line control panel of *1-2-3* contains more useful information than does *VisiCalc*'s single command line. In *1-2-3*'s Menu mode the cursor appears in the first line of the control panel, which lists a number of key words. Pointing the cursor at the key word selects a command. Once the user becomes familiar with the commands, one can be selected by typing its initial letter. It is easier to select a command by pointing. The information contained in the second line elaborates the selection possibilities indicated in the first line. This approach represents a step forward in enabling the user to manage more complex programs.

StretchCalc's command structure is a natural extension of *VisiCalc*'s, and *VisiCalc* users will have little difficulty understanding *StretchCalc*'s new features. All *VisiCalc* commands are accessed by pressing the '/' key and choosing from the mnemonic command line,
BCDEFGIMPRSTVW
Once you've memorized the commands, the operation of the program is straightforward. All the *VisiCalc* commands behave exactly the same with *StretchCalc*, and *StretchCalc* adds two more letters to *VisiCalc*'s command menu (A and U).

> *StretchCalc*'s command structure is a natural extension of *VisiCalc*'s.

Typing /A opens the door to all of *StretchCalc*'s Graph, Move, and User functions. Since *StretchCalc* adds more than 20 commands to *VisiCalc*'s repertoire, this mnemonic is only a symbolic entry point to the use of any command. Most commands are specified by two or three letters. For example, one of the most useful additions that *StretchCalc* offers is the ability to sort the rows of the worksheet by the data in one column. The command to perform that feat is /AMS (Advanced Move Sort).

The other new *StretchCalc* command is /U, which lists user-defined keys. The /U command is not really necessary for the full utilization of *StretchCalc*, but it saves two keystrokes when invoking some of the user-defined keys.

StretchCalc's command menu adds extra features to *VisiCalc*'s simple but uninformative command menu,

without complicating or improving it. *1-2-3*'s command structure is more complex, but it allows access to a wide range of commands and features, and the second line of the command menu provides information about subsequent levels of available commands.

Keyboard Convenience

Lotus predefines the use of the ten special function keys under *1-2-3* as follows: <F1> Help, <F2> Edit, <F3> Name (create a range name), <F4> Abs (absolute cell reference), <F5> GoTo, <F6> Window (split the screen and create a window), <F7> Query (repeat last data query operation), <F8> Table (run the currently defined data table), <F9> Calc (force a calculation), <F10> Graph (view the currently defined graph). These assignments cannot be changed.

VisiCalc does not use the function keys at all, but with *StretchCalc* the function keys can be assigned up to 40 new meanings when used singly or in combination with the <Ctrl>, <Alt>, and <Shift> keys. The end user is free to define these new meanings in any manner.

Anyone who has used spreadsheets for repetitive work knows that typing the same keys over and over can lead to mistakes that cause wasted time and even loss of data. Until now repetitive typing was a necessary evil. *StretchCalc* and *1-2-3* have features that help to eliminate unnecessary typing by defining long strings of characters with short keystroke combinations.

Both *StretchCalc* and *1-2-3* allow programming of the keyboard's 26 alphabetic keys when they are pressed in combination with the <Alt> key. In other words, *StretchCalc* has a total of 66 (40 function and 26 alphabetic) programmable keys, each of which can hold up to 80 characters. *1-2-3* allows programming of only the 26 alphabetic keys, but each one can hold up

	StretchCalc	1-2-3
	Keysavers	Macros
Use of function keys	Yes (40 uses)	No
Use of 26 alpha keys	Yes	Yes
Keystrokes per key	Up to 80	Up to 256
Loops and IF...THENs	No	Yes
Run-time options	Yes	Require additional programming
How stored	Separate file	With the worksheet
Single-stroke operation	Yes	No

Figure 1: Keyboard macro features

	StretchCalc	1-2-3
Sizes	Small (¼ page) Large (full page)	Full (page) Half (page) Manual adjustments of height, width, left margin, top margin, rotation
Grid	Reference dots	Horizontal lines, vertical lines, or both horizontal and vertical lines
Shading	Three types	Six types
Reverse printing	Yes	No
Choice of fonts	No	Four different fonts—two weights each

Figure 2: Graph features

	StretchCalc	1-2-3
Area	Yes	No
Bar	Yes	Yes
Component or stacked bar	Yes	Yes
Dot	Yes	*
Line	Yes	Yes
High-low-close	Yes	No
Pie	Yes	Yes
(offset slice)	Yes	No
Scatter or XY	Yes	Yes

*Although *1-2-3* does not specifically offer a dot graph, it has variations on the line graph with symbols and/or labels with or without connecting lines.

Figure 3: Graph types

to 256 characters—*1-2-3*'s limit for any type of characters stored in a single cell. Figure 1 summarizes the keyboard macro features of each program. Macros are strings of commands, each accessed by a single letter.

Perhaps the most useful feature added by *StretchCalc* is Keysaver, which allows a long, repetitive group of keystrokes to be assigned to one or more function keys with the /AUD (Advanced User Define) command. A single keystroke can thus accomplish in seconds tasks that previously took minutes. For example, a weekly payroll and accounts receivable for a small construction business requires the following operations: load the control program, load the customer backlogs, arrange the columns, insert new customers, update the labor backlog, update the receivables, save the active customer names, load the payroll program, load the cumulative labor figures, enter the week-ending date, enter the employee hours worked, recalculate, print the labor backlog, print the labor log, print the payroll report, save the cumulative labor figures, and back up customer backlogs.

Normally, *VisiCalc* takes about 1½ to 2 hours to finish this procedure. Using Keysaver to program the keys, the entire job can be done in under 10 minutes. For applications such as this, the superiority of Keysaver is a payoff item of far greater significance than the ability to recalculate (which takes less than half a minute) ten times faster.

In addition, *StretchCalc* has a single-step mode that helps to debug a Keysaver program and an impressive recall method of creating those programs. To write a Keysaver program, type the steps as if you were operating in the spreadsheet; then use *StretchCalc*'s recall function to "remember" the keystrokes you wanted in the program.

VisiCorp reports that its upgraded product, *VisiCalc, Advanced Version*, includes a "keystroke memory" feature similar to *StretchCalc*'s Keysavers. However, the *Advanced Version* was not released in time for this review.

Since *1-2-3* macros can be more complex, they may require considerably more effort to program than *StretchCalc*'s Keysavers. In *1-2-3*, for example, to make the macro move the cursor down one cell, you have to type `Down` ; using *StretchCalc*'s Keysaver, you simply press <Cursor-Down>. Each *1-2-3* macro must also be assigned a range name, an operation not required with *StretchCalc*.

In *1-2-3* macros are entered as labels and cannot have their cell references adjusted automatically. Therefore, if they are extracted from one worksheet and combined with another, they must be edited.

1-2-3's macro commands can include IF...THEN, GOTO, and QUIT commands, which make *1-2-3*'s macros more fully programmable. Furthermore, release 1A of *1-2-3* includes an autoexecution feature, which automatically executes macros when a file is retrieved. None of these programming or execution features are available with *StretchCalc*.

Graphics

Bringing a spreadsheet graphically to life is the most dramatic capability of both *StretchCalc* and *1-2-3*. Of greater importance than drama is the new power brought to the user by this "thinking tool" for analyzing numerical data. Figures 2 and 3 summarize the significant graph features and capabilities of the two programs. The figures show that although *StretchCalc* offers more types of graphs, *1-2-3* has many more features that can help tailor a graph to the user's specific needs. If graphics are not required, a stripped-down version of *StretchCalc* is available at half the price of the full program.

Viewing Graphs

With a two-monitor system *StretchCalc* requires an /AA command to tell the program that a graphics adapter is in use. No such command is necessary with *1-2-3*. If both monochrome and color graphics display monitors are available, *1-2-3* will display the worksheet on the monochrome monitor while it shows the graph on the graphics monitor. Although *1-2-3* can create graphs that are not seen on the monitor but can be printed later, this is certainly the least desirable way to create graphs. More insight into the data is possible when the numbers and the accompanying graphs can be seen and manipulated simultaneously.

Creating Graphs

Making graphs is not difficult with either of the two programs, though it is easier to get the hang of it with *StretchCalc*. Cell A1 must be left open to contain the title of the graph. Parts of column A and row 1 are also reserved for information to be used as labels in the graph. The /AM (Advanced Move) command can be used to arrange data for graphing from different areas of the worksheet. Column A must be included as the first in the list of columns for the Move command so that it is not wiped out when the selected columns arrive in order at the left side of the worksheet. After the graph has been created, the columns can be returned to their original places with the /AMU (Undo) command.

Although many graphs can be made from data in its original location on the worksheet, picking columns of data from several places is sometimes useful. You may experience some unexpected results from first attempts at rearranging columns, so the admonition in the *StretchCalc* manual to save a copy of the worksheet before rearranging anything is well taken.

Learning the default settings in *StretchCalc* takes a little experience. The manual has no central discussion of the defaults. For example, the default setting of the /Move command is to make the move permanent.

Review

Therefore, a move cannot be undone without first changing this option. Once you've prepared the worksheet as described earlier (title in A1, labels opposite their respective data in row 1 and column A), graphing and printing are easy. Place the cursor on the upper-left cell of the data, select the type of graph desired using the /AG command, indicate the lower-right cell of the data range, indicate whether the data is by row or by column, and watch the result appear on the screen. Once the graph is on screen you can modify it as desired (within the range of possibilities offered by *StretchCalc*). To make hard copy on the printer simply press the letter `P`. It takes an Epson MX-80 (or IBM Graphics) printer 1 or 2 minutes to finish one small-sized graph. On an 8½- by 11-inch page a large graph must be printed sideways. This procedure takes about 10 minutes.

Preparing *1-2-3* graphs for viewing is not difficult and is quite similar to using *StretchCalc*. However, when it comes to printing the graphs, *1-2-3* takes more time and effort. First, you must save the image of the graph in a file that is automatically given the extension .PIC. Then you insert a separate disk containing the Print Graph program in drive A. Once the program is invoked, you must select the proper graph (.PIC) file. Next, you select the graph-formatting options for font, page width, page length, top of page, size, pause, eject, and color (if you have a color graphics device, such as a Prism printer or an HP 7470 plotter). After the necessary commands are given, type `GO` to start the printer. On the MX-80 printer with Graftrax, a simple bar chart takes approximately 5 minutes to produce. The script and italic font options provided by *1-2-3* impressively show off some of the capability of the dot-addressable graphics of the MX-80; as a practical matter, however, the script is extremely difficult to read.

	StretchCalc	1-2-3
Sort from ascending to descending	2 seconds	4½ seconds
Undo (re-sort back to original state)	Blink of an eye	4½ seconds

Figure 4: Data sorting speeds (for a column of 250 numbers)

	VisiCalc	1-2-3
Columns down	63	256
Rows across	254	2048
Total cells	16,002	524,288

Figure 5: Worksheet size comparison

	VisiCalc	1-2-3
	(Number of cells filled)	
Value (1000)	12,060	41,600
Label (TEST)	12,060	16,066
Formula-S (*)	12,060	4462
Formula-L (**)	2977	1688

* Short formula: @SUM (A1 . . B1)
** Long formula: @IF ((H5/4-B2<.6#AND#H5/4-B2>0), @IF(H4/2-B3>0,B3,B3-1),0)

Available memory:

System	256K
With *VisiCalc* loaded	213K
With *1-2-3* loaded	161K

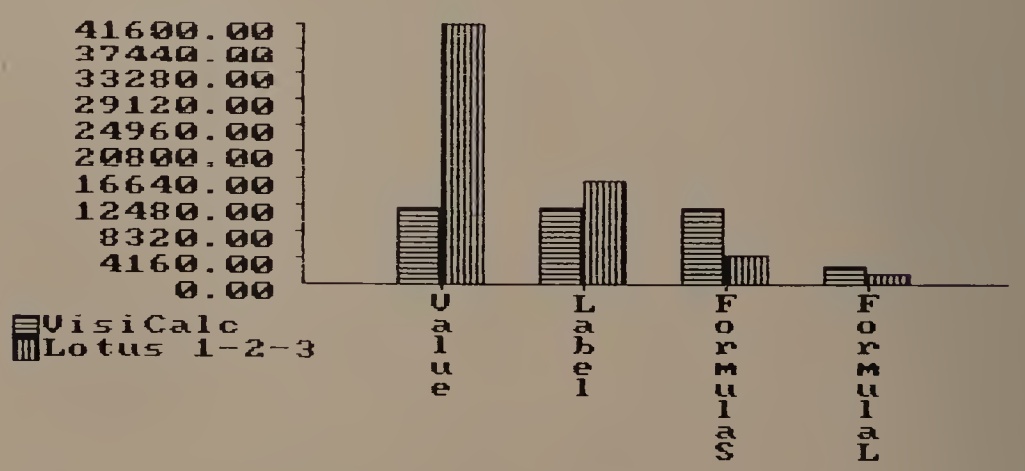


Figure 6: VisiCalc vs. 1-2-3: results of a test of useful capacity, in which as many cells were filled as memory would permit. The graph illustrating the test results was produced using VisiCalc.

The /Graph Name Use command provides the capability for naming each graph as it is created and then later recalling it by name. With *StretchCalc* this power is limited to recalling only the most recently defined graph. The <F10> key is a handy way to view a graph immediately after modifying data. You just change the numbers, press <F10>, and the new graph appears—rescaled and reformatted, if necessary.

Another handy feature of *1-2-3* is the /Reset Graph command, which clears the graphics monitor. No such feature is found in *StretchCalc*.

StretchCalc will sort formulas as easily as it sorts values or labels.

The printed graphs produced by each program are quite different in appearance (as Figures 6 and 7 illustrate). In general, the graphs printed by *StretchCalc* appear much as they do on the monitor. In contrast, the printed *1-2-3* graphs are more stylized, revealing details not displayed on the monitor.

On *StretchCalc* graphs the scale numbering on the y-axis is somewhat unusual. The top value is the largest number in the field of data to be plotted, unless the multiple option has been specified. The other values decrease in increments of 1/10 the top value. All values on the scale are shown with two decimal places. One advantage of this method of scale numbering is that the maximum value can be seen at a glance.

1-2-3 numbers the y-axis in a more conventional manner and makes the graph appear neater. Graph titles in the two programs are also quite different. *1-2-3* titles its graphs at the top, while *StretchCalc*'s titles appear at the bottom of the graph. If several *StretchCalc* graphs are printed on one page without much space in between, it is difficult to tell which title belongs to which graph.

Reverse printing of graphs (white lines on a black background) is a feature of *StretchCalc* not found in *1-2-3*. It makes a small graph stand out, but takes more time and ink to produce. Unless heavy bond paper is used, wrinkles will appear within the body of the graph.

Pie charts are a problem for both programs. Until there is some standardization in aspect ratios, pies will frequently be elliptical, with either the x-diameter or the y-diameter shortened. On an NEC JB1201 graphics monitor, *StretchCalc* pie charts are symmetrical, but *1-2-3* pie charts are elliptical with the x-diameter shortened. On the Epson MX-80 printer, *StretchCalc*'s small pie charts are elliptical with the y-diameter shortened, but the large pie charts printed sideways are appropriately round. *StretchCalc* provides an "offset slice" feature that can be used easily for emphasizing one portion of a pie chart. Leave the cursor on the cell containing the data you want to stand out and that slice will be offset.

For working analytically with numerical data, both programs offer excellent graphics facilities, especially when two monitors are used. *StretchCalc* will more quickly produce printed graphs that do not require great refinement or a special font. On the other hand, given more demanding requirements and more time to experiment, *1-2-3* will produce a finer quality product.

Data Handling

Both *1-2-3* and *StretchCalc* provide limited data management functions for spreadsheet users. *StretchCalc*'s data management is limited to simple (single key) sorting. The length of the *VisiCalc* or *StretchCalc* worksheet restricts its number of records to 254. *1-2-3*'s longer worksheet can contain over 2000 records. However, a system with 256K can hold only a limited amount of data for each of those records. For example, such a system can only contain name, address, city, state, and zip code data for a data base that is 1852 records long.

In some data management applications the speed of operation may be as important as the capacity of the worksheet. A column of 250 numbers (the odd numbers from 1 to 499) was used to test the relative sorting speeds of *1-2-3* and *StretchCalc*. The numbers were first arranged in ascending order starting with 1 (i.e., 1,3,5,...,499), then sorted in descending order, and finally re-sorted back to their original state. As Figure 4 shows, *StretchCalc* can sort a column of 250 numbers faster than *1-2-3*.

1-2-3 sorts a single column (1,3,5,...,3999) of 2000 records in 40 seconds. For some users the capability to handle more records, regardless of the time it takes, means that *1-2-3* has greater potential and usefulness for data management applications than *StretchCalc*.

For *1-2-3* to perform any of its data operations, the data range of fields must be formatted as values or labels, not formulas. *StretchCalc* will sort formulas as easily as it sorts values or labels and if necessary will automatically adjust formulas for their new cell locations. This makes *StretchCalc* useful for sorting within the body of a worksheet.

On the other hand, *1-2-3* has several useful data commands not available in *StretchCalc*, including primary and secondary key sorts, data query (searching or extracting), data frequency distribution, data fill, and data table. These features are impressive in a spreadsheet program, but they hardly qualify to make it into a true data base manager. The data table is *1-2-3*'s most interesting data command. It permits iterative calculations of a formula that depends on up to two variables, each of which can be assigned several values. After formatting a table for the results, the command will apply each value of each variable in turn, producing a table of the results. In this way the results of several "what if" calculations can be tabulated and compared.

Review

Spreadsheet Capabilities

Since *StretchCalc* builds on the base of the *VisiCalc* worksheet, the relevant comparisons of size and capacity are between *VisiCalc* and *1-2-3*. Unless otherwise indicated, references to *VisiCalc* also apply to *StretchCalc*.

1-2-3's worksheet is 32 times the size of *VisiCalc*'s. At first introduction to *1-2-3*, a *VisiCalc* user is impressed by the sheer size of the worksheet. Figure 5 indicates the size differences. However, in any practical application the capacity of a worksheet is a function not only of the number of cells available to fill but also of the amount of memory in the system. In a 256K system, only 8 percent (41,000) of the cells in a *1-2-3* worksheet can be filled.

The results of a test performed to determine the useful capacity of both programs are summarized in Figures 6 and 7. The test was conducted on a 256K system by filling as many cells as memory would permit with a value, a label, a short formula, and a longer formula in succession. Release 1 of *1-2-3* was used for the test. Release 1A, which came out too late to test, requires more RAM (192K instead of 128K) and will therefore probably not fill as many cells on a computer with 256K as the tested version.

In the test the number of cells filled and the time required to fill them were recorded. That is, the worksheet was first loaded with a value (1000), using the total 256K memory capacity; next the data was recorded; and finally the worksheet was cleared. The process was repeated using a label (TEST), a short formula, and a longer formula. In all test runs, both programs' worksheets were loaded to a depth of 250 rows.

With a 256K system nearly all of *VisiCalc*'s 16,002 cells can be filled with values, labels, or short formulas. Although fewer than 8 percent (41,000) of *1-2-3*'s cells can be filled with values and fewer than 1 percent (4400) of its cells can be filled with short formulas, the usable worksheet area is still quite a bit larger than what *VisiCalc* offers. It will take considerably more than 256K of system memory to begin to take full advantage of *1-2-3*'s grid size.

Figure 8 shows the results of two calculations made on the data from these tests. These calculations compare the efficiency with which each program uses memory (number of bytes per cell) and the generalized loading speed (seconds per cell).

In efficiency of memory use, *1-2-3* performed better with labels and astonishingly well with values. *VisiCalc* was better with both long and short formulas. *VisiCalc* loaded labels faster, but *1-2-3* excelled in the other three loading speed categories. Values take longer to load than labels with either program. Formulas take longer to load than either values or labels, and, as you would expect, long formulas take up more space than short ones.

1-2-3 offers two important features that enhance user control of calculations: natural calculation and iteration. Natural calculation practically eliminates forward references on the worksheet and represents a definite improvement over *VisiCalc*. Iteration provides a means to specify the number of times a worksheet cycles through all its formulas. This feature can be particularly useful in solving problems that require repetitive calculation.

1-2-3 provides many formatting features not found in *VisiCalc*, including the variation of individual column widths from 1 to 72 characters. *1-2-3* allows writing over cell boundaries, provided the cell to the right is empty. Labels can be centered in the cells, as well as right or left justified. Formatting allows 0 to 15 decimal places to be fixed, and large numbers can be displayed with commas to make them more readable. The currency format adds a dollar sign before each entry, inserts commas in large numbers, and places negative values in parentheses. The percent format multiplies a value by 100 and appends a percent sign to the result. Cell protection prevents designated cells from being changed by other cells. The text format shows formulas as they were entered. (By copying a range of cells and splitting the screen into two windows, the program can display formulas in one window and the numerical results of those formulas in the other.) The date format stores dates as number of days since the beginning of the century. Since *StretchCalc* does not expand on *VisiCalc*'s range of formatting options, the features listed above make *1-2-3* clearly superior in this regard.

VisiCalc incorporates 31 @ functions that can be used as parts of formulas. These functions specify the logical, mathematical, financial, trigonometric, search, and other numerical operations that make the program flexible. *StretchCalc* utilizes all of these functions but does not add to them. *1-2-3*, on the other hand, adds 23 more functions to the list as shown in Figure 9.

Although some of the functions listed will be attractive to certain users, few of them add fundamentally new calculation capabilities to the worksheet. The date functions will be a welcome addition for dating the worksheet and for doing financial work that requires figuring days between dates.

Rearranging columns on *VisiCalc* worksheets can be painfully slow. They must be done one at a time, and the syntax is awkward and thus hard to remember. To move a column to the right in *VisiCalc* you specify the destination column as the one to the right of the intended location; to move a column to the left you specify the destination exactly. With *StretchCalc*'s /AM (Advanced Move) command you list the order in which the columns are to appear, and they are rearranged at one time and appear at the left side of the worksheet. The columns can be returned to their

	VisiCalc	1-2-3
	(Min:Sec)	
Value (1000)	3:42	5:09
Label (TEST)	:28	1:07
Formula-S (*)	8:47	:39
Formula-L (**)	8:00	:45

* Short formula: @SUM (A1 . . B1)
**Long formula: @IF ((H5/4-B2<.6#AND#H5/4-B2>0), @IF(H4/2-B3>0,B3,B3-1),0)

Available memory:	
System	256K
With *VisiCalc* loaded	213K
With *1-2-3* loaded	161K

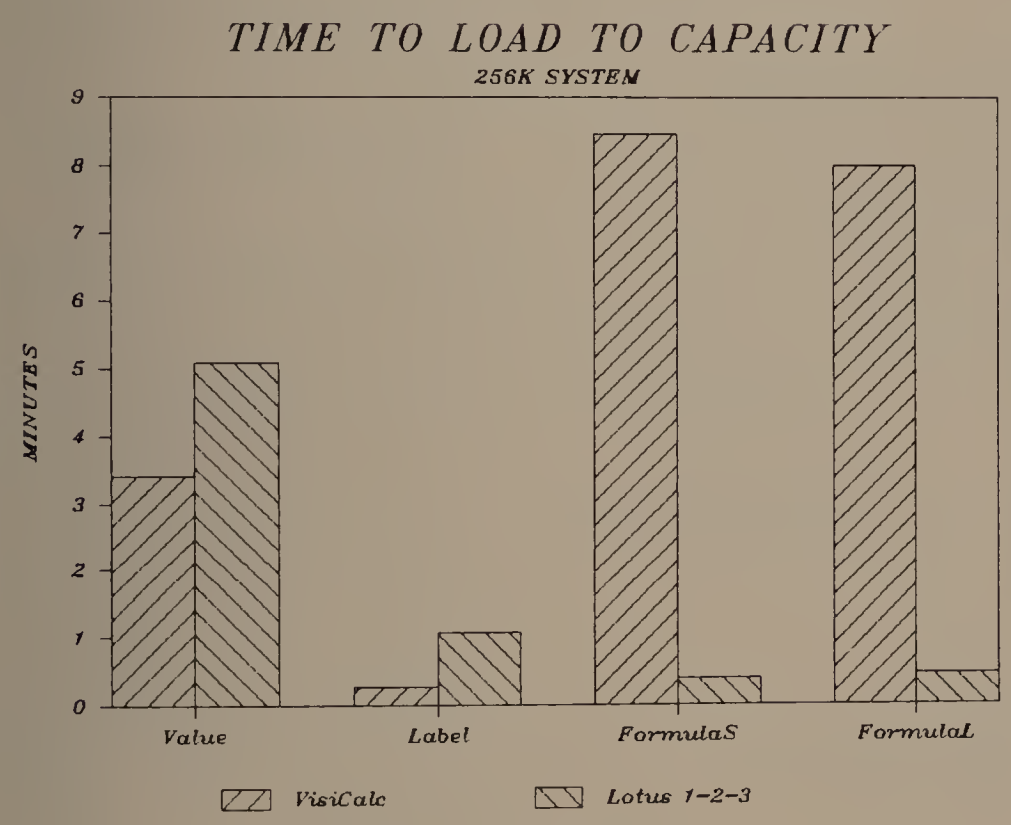


Figure 7: VisiCalc vs. 1-2-3: results of a test of useful capacity showing the time needed to fill as many cells as memory would permit. The graph illustrating the results was produced using 1-2-3.

original positions just as easily using the /AMU (Advanced Move Undo) command.

The /AM command is fast: a column of 254 numbers that takes *VisiCalc* 10 seconds to move is done in 1 second with *StretchCalc*. *StretchCalc* also allows a combination of cell blocks including single columns and ranges of columns to be moved at the same time. This feature is not available in *1-2-3*.

1-2-3 provides flexible features for moving the cursor around the worksheet and for moving and adjusting data and formulas. In this regard it is superior to the *VisiCalc/StretchCalc* combination. Pressing the <End> key and then one of the cursor keys will cause the cursor to jump quickly to the appropriate corner of the work area or worksheet. The <End>-<Home> key combination takes the cursor to the lower-right corner of the active area. <PgUp>, <PgDn>, <Tab>, and <BackTab> enable full

REACH
For The PRO...



...When you are ready to expand your IBM PC-XT with multi-function add-on boards, ask for

The PROFESSIONAL™ Series

***Professional I Series**
(64-256KB, Clock, 2 Serial, Printer)
****Professional II Series**
(Clock, Game, 2 Serial, Printer)
Professional III Series
(Async, SDLC, Printer, Clock)

Paso Com
Dealer Inquiries Welcome
P.O. BOX 2603
MISSION VIEJO, CA 92690
(714) 552-0130
*$295 (64KB, 1 Serial Printer) Special introductory price through August 26.
**$159 (Clock, 1 Serial)

Reader Service #135

IBM Personal Computer =
DEC VT100?, DEC VT125?, DASHER D400?
SmarTerm™/PC Does It!



Join with over 1000 other large and small companies, universities and individuals who have discovered the advantages of using truly intelligent communications software from **Persoft, Inc.**

SmarTerm™/PC Emulators Include:

- full emulation of terminal characteristics up to the limits of standard IBM PC hardware
- 75 to 9600 baud operation with x-on/x-off support
- integral, high-speed, bi-directional, protocol-free ASCII file transfer
- optional error-free protocol which allows ASCII and binary files to be transferred between PC's or between the PC and the host computer (requires user programming on host computer)
- multiple "user-friendly" setup configurations
- user-defined softkeys for simplified auto-dial and log-in support
- full local printer support
- runs under PC DOS operating system using monochrome or 80-column color monitor
- keytop chart (fits on keyboard), reference card, and user manual
- 30-day money-back guarantee if not satisfied with program
- unlimited telephone support during normal business hours

Currently available for:
- VT100, VT101, VT102, and VT52 terminals Price: $58–$150*
- Dasher D100, D200, D400 terminals Price: $50–$125*

Coming soon:
- TeleVideo 950 terminal
- VT125 graphics terminal

We accept company purchase orders, MasterCard, and Visa.

*depending on quantity
†Also runs on Compaq™ and Columbia™ computer systems.

Available through your local computer dealer or directly from:

Persoft, Inc.
2740 Ski Lane
Madison, WI 53713
(608) 233-1000

Software for Professionals . . . by Professionals

SMARTERM is a trademark of Persoft, Inc.•VT is a trademark of Digital Equipment Corporation•Dasher is a trademark of Data General Corporation.

PC LOGO IS HERE!

The Logo language for the IBM-PC® is here. **PC LOGO** is a full implementation of Logo including word and list capability as well as turtle graphics. Since **PC LOGO** incorporates much of the syntax of Logos available on other computers, it is easy to learn. Yet **PC LOGO** goes far beyond other versions of Logo by taking advantage of the extra features of the IBM PC including function and arrow keys and provides a greatly enhanced editor.

IBM-PC is a registered trademark of IBM Corp.



PC LOGO features include:
- Program and Utility Disks
- Runs with IBM DOS
- Complete Tutorial and Reference Manuals
- Full peripheral communication capability
- 64K expandable to 128K
- Function keys defined

$199.95 complete

To order **PC LOGO**, contact:

Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143
(617) 492-2999

(Dealer Inquiries Welcome)

Reader Service #323

Review

screen shifts in all four directions. The <F5> key is dedicated as a GOTO, allowing cursor jumps to specified cells.

The most important *1-2-3* feature for rearranging data on the worksheet is the /Range command. For example, the /Range Move command enables the relocation of data within a specified rectangular area to any other rectangular area of the same size. When this command is executed, the data is moved, formulas are adjusted (if desired), and the old data is erased from its original location. With *VisiCalc*, data must be replicated in one step and blanked out in a second step.

With the /Range commands, as with many other commands in *1-2-3*, three options specify the range: point, type, and name. Pointing the cursor to indicate the desired cell or typing its designation are familiar procedures to *VisiCalc* users. However, *1-2-3* places a restriction on the use of these procedures. In *VisiCalc*, if you start specifying a range by pointing to the original cell, you have the option of either pointing to or typing in the end cell. In *1-2-3*, if you type the first one in, you must also type the next one in; that's not quite as convenient as *VisiCalc*'s procedure in some cases.

The need to point, type, or even remember cell locations is eliminated by *1-2-3*'s ability to name ranges. Once a range is named, the worksheet remembers the name and its location. No equivalent of the /Range Name command is found in *VisiCalc* or *StretchCalc*.

1-2-3 offers additional printer controls for producing useful output from the worksheet, such as printing today's date, paper advance and alignment, page numbering, headers, footers, and page length. None of these are provided by *VisiCalc*. *StretchCalc* offers a line-feed and form-feed feature at the touch of one key after printing graphs.

File Swapping

Since *StretchCalc* essentially adds features to *VisiCalc*, their files are interchangeable. *VisiCalc* has been adapted from 8-bit systems to the IBM PC. DIF (Data Interchange Format) files provide the standard file format to facilitate the exchange of *VisiCalc* data files. No translation is needed.

VisiCalc or *StretchCalc* files must be translated before they will run on *1-2-3*. Included with the Lotus *1-2-3* package are translation programs that will convert *VisiCalc* and *StretchCalc* files to *1-2-3* files, DIF files to *1-2-3* files, or *1-2-3* files to DIF files. There is no provision for translating *1-2-3* files directly to the *VisiCalc* format.

In translation, *VisiCalc* files become considerably larger and thus require more disk space. For example, a 156,800-byte *VisiCalc* file took 12½ minutes to translate and increased in size to 255,278 bytes. The larger size meant that the file no longer fit on a single-sided disk. However, the greater penalty is that the larger file requires more system memory. On the other hand, performance of *VisiCalc* files can be dramatically improved by translating them to run with *1-2-3*. For example, a *VisiCalc* surveying program, which when translated expanded from 49K to 72K, originally took 5½ minutes to load and 5 minutes to run. The translated version of the same program on *1-2-3* took under 1 minute to load and 25 seconds to run.

Other results of translation may be somewhat unexpected. Cells originally formatted as '$' in *VisiCalc* come out with dollar signs in *1-2-3*, even though the originals did not have dollar signs. This phenomenon is caused by *1-2-3*'s default currency mode. To display the data as it appeared in *VisiCalc* you would have to reformat the range to ',' (the comma format).

Seeing the 'Formula error at X2' message appear during the translation can also be disconcerting. This is apparently due to the way that *1-2-3* handles AND, NOT, and OR in its formulas. It treats these as logical

	Efficiency of Use of Memory	
	VisiCalc	1-2-3
	(bytes per cell)	
Labels	18	10
Values	18	4
Short formulas	18	36
Long formulas	72	96
	Loading Speed	
	VisiCalc	1-2-3
	(seconds per cell × 1000)	
Labels	2	4
Values	18	7
Short formulas	44	9
Long formulas	162	28

Figure 8: Loading efficiency and speed

Mathematical: @ATAN2, @MOD, @RAND, @ROUND
Financial: @IRR, @FV, @PV, @PMT
Date: @DATE, @ DAY, @MONTH, @YEAR, @TODAY
Statistical: @STD, @VAR
Data base: @DCOUNT, @DSUM, @DAVG, @DMIN, @DMAX, @DSTD, @DVAR
Search: @HLOOKUP

Figure 9: 1-2-3 @ functions not found in VisiCalc

	StretchCalc	1-2-3
Disk drives	1 single-sided	2 double-sided
RAM	128K	128K*
Memory available for worksheet space in a 128K system	25K	31K
Other software required	VisiCorp's *VisiCalc*, extended memory versions, or IBM's *VisiCalc*, version 1.1 or greater	None required
Printer	Desirable	Desirable for graphics
Graphics board	Yes	Yes
Graphics monitor (B&W or color)	Yes	Can print graphs without monitor

*(Release 1A requires 192K)

Table 1: Requirements of StretchCalc and 1-2-3

An Epson FX Without Set-FX™ is Like a Porsche Without a Key



Your Epson FX printer is a powerful machine. Alas, getting into the driver's seat isn't always easy. Set-FX software lets you and your IBM PC take your FX for a real tour. It's as simple as touching a key and taking off.

With Set-FX, you can now conveniently:

- **Print** those missing IBM characters as they appear on the screen, including block and line graphics, foreign characters, and math & science symbols.
- **Set** print modes to condensed, emphasized, italics, proportional, and 50 more.
- **Create** your own typefaces for logos, forms, and unique styles.
- **Explore** your FX's capabilities with our FX-Ideas program, Instructional Manual, and Quick Reference Card.

Race away with Set-FX . . . it prints in full-speed text mode!

At last, you get the printer control, IBM character set, custom typefaces, and high-speed printing in one comprehensive package.

For the key to great performance from your Epson FX, ask your dealer or order direct. **Introductory price** $39.95 until Nov. 1, 1983.

SoftStyle, Inc.
Suite 200, Dept. B10
7192 Kalanianaole Hwy.
Honolulu, Hawaii 96825
(808) 396-6368

SoftStyle™

For any IBM PC with Epson FX-80 or FX-100 DOS 1.1 or 2.0 Introductory price includes air shipping MC & VISA accepted

Review

operators, rather than as @ functions the way *VisiCalc* does. When the translation program sees one of these, it gives the formula a label-prefix so that it will show up on the worksheet. The fix can be time consuming, though it is not difficult: remove the label prefix, delete the @ followed by the logical, and then reinsert #AND#, #NOT#, or #OR# in the appropriate position between, rather than ahead of, the arguments.

King of Spreadbase

The electronic worksheet is the foundation upon which the rapid growth of microcomputer business applications has been built. Until a few months ago *VisiCalc* was the cornerstone of such applications. In the process of challenging *VisiCalc*'s supremacy *1-2-3* has opened new horizons for the microcomputer. *StretchCalc* provides innovations that ensure the continued use of *VisiCalc* in a broader market than it has previously known. For a *VisiCalc* user *StretchCalc* offers a considerable enhancement in features and functions for a modest investment in software and effort.

For the user with sufficient disk drive capacity and the willingness to invest a little more money and time, *1-2-3* offers capabilities not available with *StretchCalc*. These include the larger worksheet, additional formatting possibilities, more @ formula functions, better ability to move the cursor and data around the worksheet, and natural calculation.

Both programs provide ways to eliminate keystrokes. These facilities are easier to program and use with *StretchCalc*, but they can be made to perform more complicated operations with *1-2-3*.

StretchCalc's ability to produce many types of graphs easily—and to print them just as easily—is outstanding. Although printing graphs with *1-2-3* takes more time, they can be beautiful.

Neither *1-2-3* nor *StretchCalc* provides elaborate data management functions. *StretchCalc* is limited to sorting the worksheet on one key, but it performs this function extremely well. *1-2-3* can perform many more operations on a longer data base than *StretchCalc*. In fact, its data management capabilities are remarkable in a spreadsheet program.

It boils down to a matter of needs and style. If you already have *VisiCalc* and need integrated graphics and keyboard macros more than data management, a small investment in *StretchCalc* will bring great returns. That's also true if you don't have *VisiCalc* and are on a tight budget, but the choice isn't quite as clear. However, if you're most interested in pushing the performance limits of your computer, and especially if you think help screens are important, *1-2-3* is the current King of Spreadbase.

Edwin T. Moore is an engineer/builder living in Underhill Center, Vermont, and a consultant in the use of the IBM PC for small business and community government applications.

StretchCalc
Multisoft Corp.
14025 S.W. Farmington Rd.
Beaverton, OR 97005
800/322-4110, 503/626-4727
List Price: $99, Little StretchCalc (without graphics—mail order only) $49
Requirements: see Table 1

VisiCalc
VisiCorp
2895 Zanker Rd.
San Jose, CA 95134
408/946-9000
List Price: $250; VisiCalc, Advanced Version not announced
Requirements: 64K, one disk drive

1-2-3
Lotus Development Corp.
55 Wheeler St.
Cambridge, MA 02138
800/343-5414, 617/492-7171
List Price: $495
Requirements: see Table 1

With all the clamor about personal computers, a fundamental fact is often overlooked: some simply *work* better than others.

Consider the COMPAQ Portable.

A computer will make you more productive. A computer will make you more efficient. You hear it everywhere. But you don't hear much about which computer actually *works* best.



The COMPAQ Portable fits under a standard airline seat for business trips.

Works in more places

With the COMPAQ™ Portable, you can be as productive in your hotel room or your lake house as in your own office. It's a reliable companion on a business trip. It's a powerful sales aid in your customer's office.

You can move it from office to office to share its resources. You can move it into the conference room to answer questions.

What's more productive than a computer? A computer that works for you in more places.

Works with the greatest number of programs

The most important consideration when choosing a computer is "what programs will it run?"

The COMPAQ Portable runs more programs than any other portable. In fact, it runs more than most non-portables because it runs all the popular programs written for the IBM® Personal Computer without any modification. There are hundreds of them. They are available at computer stores all over the country.

Imagine the power of a *portable* word processor. There are dozens of word processing programs available for the COMPAQ Portable.

Planning, problem-solving, and "what-ifs" are a cinch with a variety of popular electronic spreadsheet programs. The COMPAQ Portable runs them all.

There are accounting programs for anything from computerizing your family budget to full-scale professional management of payables, receivables, inventory, and payroll.

There are programs for making charts and programs for communicating with other computers.

So you get portability and you don't give up problem-solving power. The combination adds up to the most useful personal computer on the market today.

Add-on options make it work the way you work

Inside the COMPAQ Portable are three open slots. Most portables don't have any. Electronic devices called expansion boards fit those slots and give the COMPAQ Portable new powers. As with programs, expansion boards designed for the IBM will work. With them, you can make your personal computer more personal.

Want to check a stock price? One expansion board enables the COMPAQ Portable to handle those communications over ordinary phone lines.

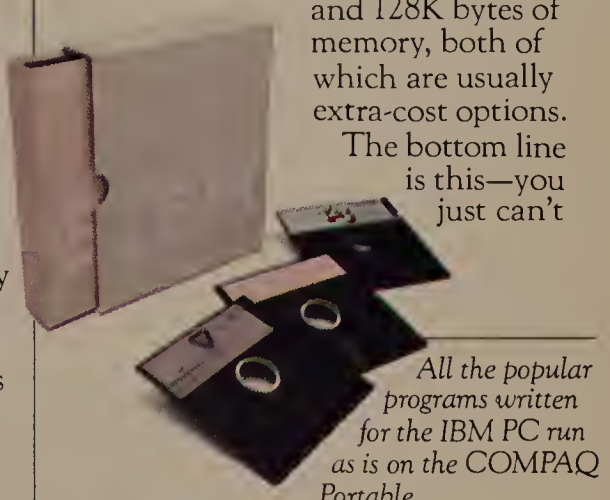
Want to use your company's central computer files while you're on a trip? There are boards that allow the COMPAQ Portable to communicate with a variety of large computers.

Other boards let you hook up controllers for computer games, increase memory capacity, or connect several personal computers in a network.

The added usefulness is free

The COMPAQ Portable doesn't cost any more than an ordinary desktop computer. In fact, it costs hundreds less than a comparably equipped IBM or Apple® III. The COMPAQ Portable comes standard with one disk drive and 128K bytes of memory, both of which are usually extra-cost options.

The bottom line is this—you just can't buy a more practical, useful, productive computer. Compare the COMPAQ Portable.



All the popular programs written for the IBM PC run as is on the COMPAQ Portable.

For the location of the Authorized Dealer nearest you, call 1-800-231-9966.

©1983 COMPAQ Computer Corporation
COMPAQ™ is a trademark of COMPAQ Computer Corporation.
IBM® is a registered trademark of International Business Machines Corporation.
Apple® is a registered trademark of Apple Computer Corporation.



COMPAQ™

Common sense and uncommon design

Reader Friendly

PC WORLD

The Complete Magazine for IBM Personal Computer and IBM PC Compatible Users.

You are using or soon plan to use an IBM Personal Computer or IBM-compatible personal computer. You've just scratched the surface, just started to explore the vast potential of this remarkable machine.

How can you use this potential and get more out of your PC? How can you keep pace with the fast-moving news and developments in the field, with the rapidly growing body of available software and the new ideas, discoveries, applications, and innovations?

Now there's a way—with **PC WORLD**, the lively, authoritative, new magazine devoted exclusively to IBM PC and IBM-compatible PC users.

Every month **PC WORLD** will keep you posted on the most interesting, intriguing, and potentially useful applications for the IBM PC and compatible PCs. And it will explain them to you with a minimum of technical jargon—and with a degree of clarity you'll appreciate if you try them out on your own PC.

It's a magazine that will help you get more of everything you want out of your PC—utility, versatility, value, and satisfaction. And it will present you with well researched, scientifically correct, easy to read articles in magnificently designed issues that are beautifully illustrated in full color. You'll want to keep each one for your future reference—beginning right now.

Now for a limited time only you can take advantage of this low introductory rate and save 47% off the newsstand price for **PC WORLD**. Enter your subscription today and you will receive three FREE issues—for a total of 15 monthly issues at the low introductory rate of only $24. If you're not completely satisfied with **PC WORLD**, you may cancel your subscription and receive a full refund on all unmailed issues.

If you already have an IBM Personal Computer or are thinking of buying one, this is the magazine that revolves around you.

15 issues for $24
27 issues for $39
39 issues for $53

VISA and MasterCard orders call: 800/247-5470 (800/532-1272 in Iowa)

Subscribe Now

Don't miss our low introductory rate:

- 15 issues—3 Free
- Save 47% off the newsstand price

This is a limited time offer...act now to avoid disappointment!

CHARTER PRICES:
15 issues, $24.00
27 issues, $39.00
36 issues, $53.00

PC WORLD
Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621

Toll-free order lines, for VISA and MasterCard orders: 800-247-5470 (in Iowa call 800-532-1272)

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621 J2070

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621 J2070

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621 J2070

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

Subscribe Now

Don't miss our low introductory rate

NOAH WEBSTER, MEET YOUR MATCH.



A few months ago, Jennifer would rather have gone to the dentist than do her spelling homework.

Then Mom bought Crypto Cube™ by DesignWare.™ Now Jennifer has become a word fiend. In fact, she spends hours paging through the dictionary to find words that will stump her parents. And, as she does, she builds her word skills.

Crypto Cube, like all DesignWare software products, combine computer game fun with sound educational principles.

THE THREE DIMENSIONAL COMPUTER WORD PUZZLE.

Five minutes after Jennifer sat down at the computer with Crypto Cube, she was hooked. First she worked her way through the many word puzzles that come with the game. Then her parents typed her spelling homework into new puzzles.

Then Jennifer started making puzzles for her parents!

So now, Crypto Cube is the favorite family game in Jennifer's home.

As Jennifer would say, "indubitably."

DESIGNWARE MAKES LEARNING COME ALIVE.

If you own an Apple][plus, Apple //e IBM-PC, Atari 400, 800, or 1200XL with a disk drive, you should take a close look at all the DesignWare software.

Another word game, Spellicopter,™ is an action-packed spelling game. You'll fly perilous missions through crowded skies and mountainous terrain to rescue words. And you'll want to keep an eye out for our new math and science games. See your local dealer or call DesignWare at (800) 572-7767, in California (415) 546-1866 for our free software catalog. You'll be delighted with the way your kids will learn with DesignWare.

And they'll be playing for the fun of it.



DesignWare™

LEARNING COMES ALIVE.

1200XL, IBM PC and Apple][plus and Apple //e are trademarks of Atari, Inc., IBM Corp. and Apple Computer, Inc. and are not related to DesignWare.



Shift into Ultradrive.



Targa for the IBM-PC is supplied with both MS-DOS and CPM-86 compatibility. Other computers supported under CP/M.
IBM-PC is a registered trademark of International Business Machines Corporation, MS-DOS is a registered trademark of Microsoft, and CPM-86 is a registered trademark of Digital Research, Inc.



Targa™: The ultimate mass storage machine for your IBM®-PC, and other microcomputers.

With up to 30 megabytes of hard disk capacity, you can handle data bases that would fill phonebooks. And access, process, and update that data in seconds.

Which, after all is what serious personal computing is all about.

The Purr of Performance.

Targa is one beautiful piece of engineering.

Fast. Data glides in and out at 5 million bits per second.

Quiet. Even with disks spinning at 3600 rpm inside.

And solid. Targa is built to deliver uncompromising performance.

Automatic Is Standard.

Just plug the Targa into your PC, and you're ready to go.

Targa comes with plain English instructions and plenty of software. Easy to use, clearly documented programs help you transfer data in and out, use powerful system utilities, and diagnose problems.

The Luxury Model at Economy Prices.

You may order your Targa directly from the CMC factory, one of the world's oldest micro-computing hard disk manufacturers, or, contact us for the name of your local dealer.

Powerful standalone Targa mass storage systems start at $1550. Considerably less than many lesser systems.

Targa 50	5 megabyte models from $1550
Targa 150	10 megabyte models from $1890
Targa 150	15 megabyte models from $2190

Prices include shipping and handling. Call for prices on expanded capacity models.

Take A Test Drive.

No risk.

We'll ship your Targa factory direct. Then give you 30 days to make sure you're satisfied. If not, we'll refund you full purchase price. Plus your return postage costs.

To reach our professional sales staff, call toll free, **800-CMC-INTL.** (In Washington, dial 206-885-1600.)

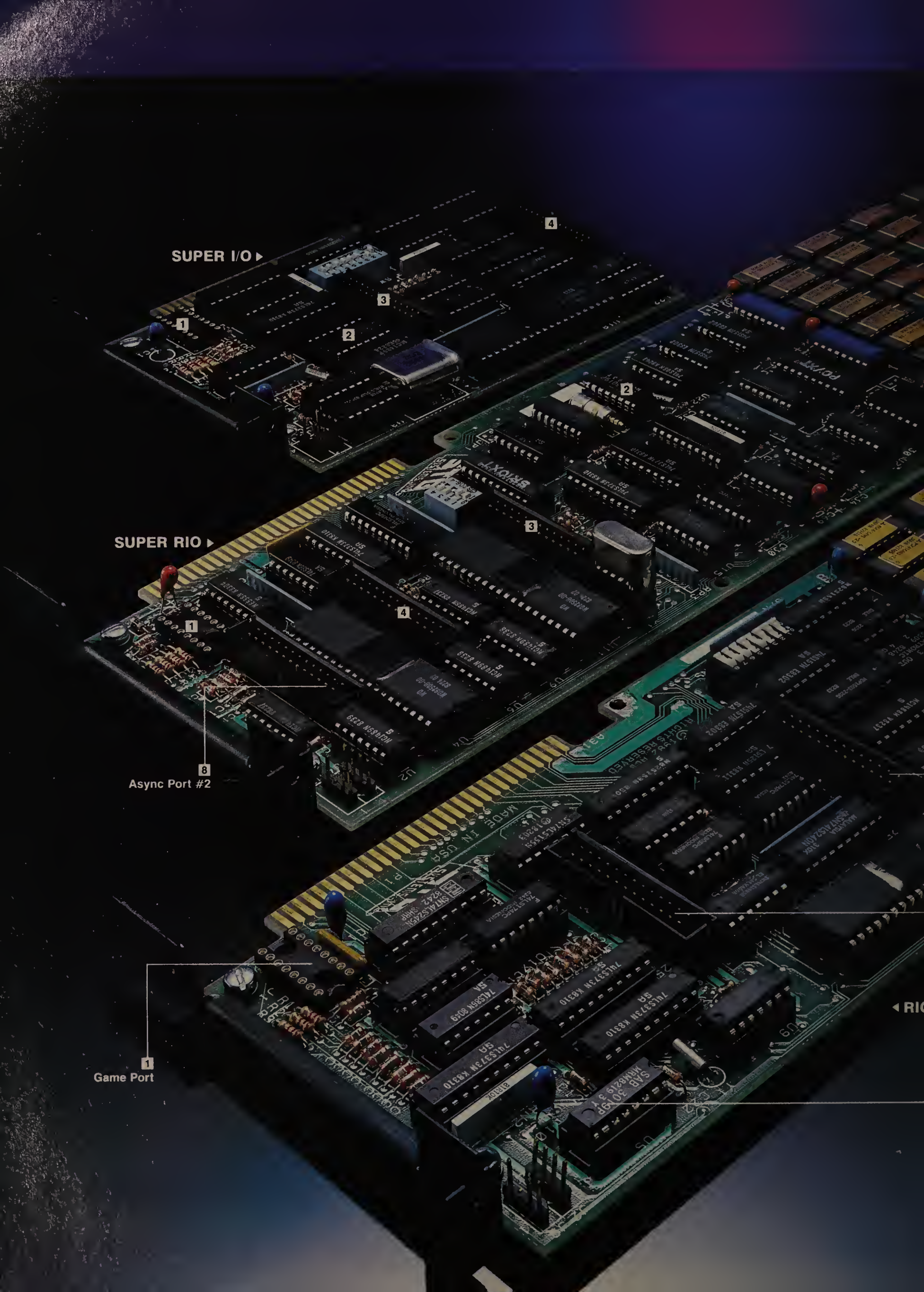
You can charge the Targa to any major credit card. Or you can send a check, money order, or wire transfer. Your Targa will arrive within days.

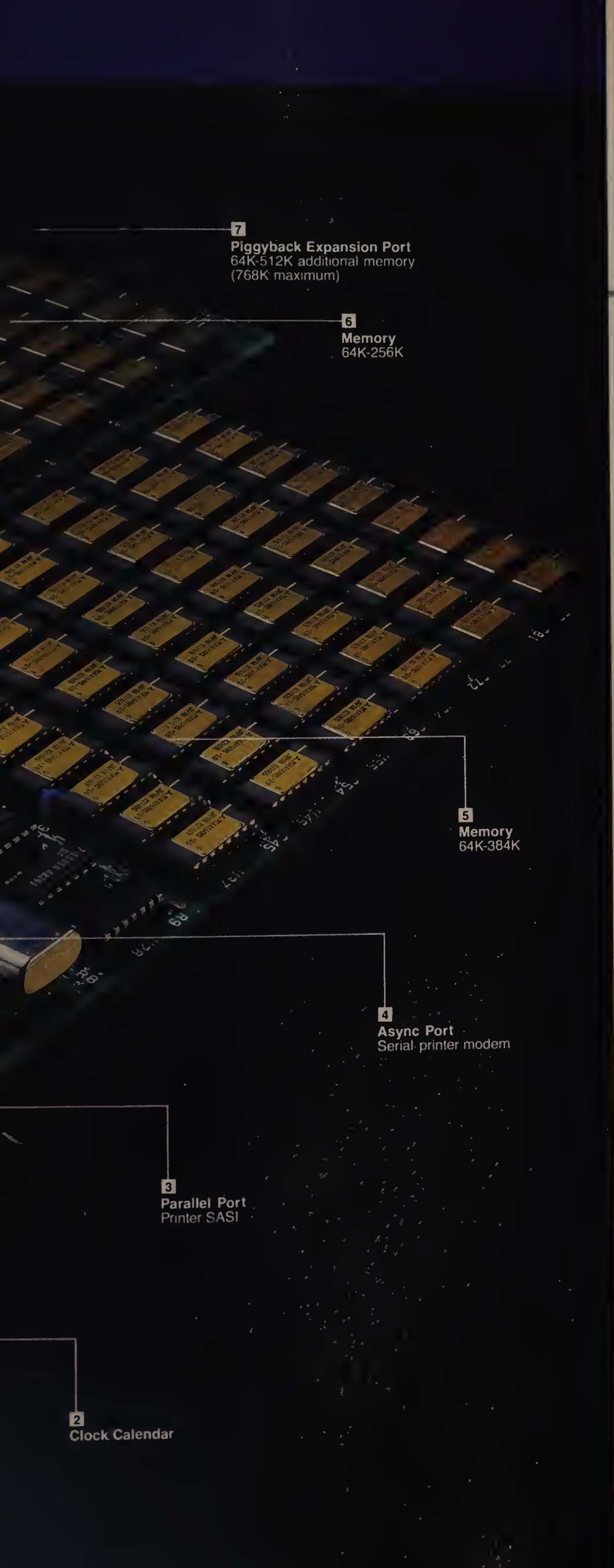
And your personal computer will get a much needed boost in mass storage horsepower.



TARGA *BY CMC*

CMC INTERNATIONAL — BELLEVUE, WASHINGTON 98005


SUPER I/O
SUPER RIO
Async Port #2
Game Port



What you get out of your IBM PC/XT depends on what you put into it.

The versatile multi-function boards from STB offer more functions and more memory.

If your personal computing applications have outgrown your personal computer's hardware, there's a smart way of expanding your system while still leaving plenty of room to grow.

The secret is the line of multi-function boards from STB.

Our SUPER RIO™ combines two asynchronous RS-232-C serial communication ports for interfacing modems, serial printers, plotters, mice, and an almost limitless list of other peripherals, a parallel I/O port for interfacing printers and hard disk controllers, a battery operated clock/calendar that remembers the date and time even when your system is turned off, a game paddle port that can uses either APPLE™ or IBM™ compatible joysticks, and up to 256K of additional memory.

The STB Piggyback™ board adds up to 512K more memory onto the SUPER RIO for a total of 768K. And the pair uses only one expansion slot.

Included free with the SUPER RIO board is the PC Accelerator™, which combines printer buffering and high speed disk emulation into one easy to use program.

Our RIO PLUS™ board includes all of the I/O functions of the SUPER RIO (less one serial port) with on board memory expansion capability of up to 384K. When used with a 256K computer, this board gives your system a full 640K of memory. Of course, PC Accelerator is also included with every RIO PLUS.

If you already have enough memory, the STB SUPER I/O™ board adds a parallel I/O port, serial port, game port, clock/calendar and PC Accelerator to your system. And, its small enough to fit in a short slot on the XT.

As new functions and applications arise, you can count on STB Systems to provide convenient, affordable ways to adapt these innovations to your system.

Compare our quality products at your local dealer, or for more information please write or call us.

Expanding Microcomputing

STB™

STB Systems, Incorporated

601 North Glenville, Suite 125, Richardson, Texas 75081/(214) 234-8750

All STB multi-function boards include a serial and parallel cable plus an external mounting bracket.
Apple is a registered trademark of Apple Computers, Inc.
IBM is a registered trademark of International Business Machines Corporation.
PC Accelerator is a registered trademark of ResiCorp.

© 1983 STB Systems, Inc.

Reader Service #254

Corona: For Here or to Go

Corona offers a pair of IBM PC compatibles: a desktop and a portable model.

David C. Keith

What does it take to challenge the IBM PC? More to the point, why would a prospective buyer want to buy a compatible computer instead of the real thing? This examination of two of the most serious challengers—the Corona PC and the Corona Portable PC—seeks the answers to these questions.

The primary reasons for considering an IBM PC-compatible computer instead of the original are motherboard RAM expansion capability, user-friendliness, additional hardware features, bundled software (applications software included in the purchase price of the computer), and perhaps most importantly, price. Corona has admirably addressed these issues with two new computers.

> The portable is ruggedly constructed.

Corona has wisely chosen to profit from IBM's experience. IBM had originally intended to attack the Apple market head-on by offering a basic system that retailed for about $1295, only to find that people were not buying that unit. They were instead buying an upgraded unit, usually with two disk drives and more memory. Corona has tailored its system specifically to this upgraded, business-oriented market.

The Desktop Corona

The desktop Corona PC has an obvious resemblance to the IBM PC. The Corona chassis offers several improvements, however, including double rows of slots along both sides to provide improved cooling capabilities. This, along with the necessary but very noisy fan, should provide more than adequate cooling even if all four expansion slots are filled.

By taking out four screws, the top of the computer can be removed in well under a minute, providing easy access to the four available expansion slots and the memory sockets. To provide additional support Corona has provided adjustable, vertical rear guide slots for the expansion boards. The Corona comes standard with 128K RAM and is expandable to a full 512K RAM on motherboard sockets located directly beneath the expansion slots. The IBM PC offers a maximum of 256K RAM on the motherboard before the user must add memory expansion boards.

While Corona does supply a socket for inclusion of the Intel 8087 floating-point math co-processor, it is located under the left disk drive. After eight screws have been removed, the entire disk drive, power supply, and inner framework release and swing back as a unit, permitting access to the motherboard. The expansion boards must be removed, however, before the disk drive and power supply assembly can be safely moved back.

The Corona motherboard includes DMA (direct memory access) floppy disk controllers, one parallel and one serial (RS-232C) I/O port, and a video monitor controller (monochrome). This leaves all four expansion slots available for the addition of any IBM PC-compatible expansion boards. By comparison, a similarly configured IBM PC will have only one expansion slot free.

The Corona PC comes standard with one MPI double-sided floppy disk drive; an additional double-sided floppy drive or an internally mounted 10M Winchester drive is optional. The floppy drives on two of the four computers I tried were annoyingly loud when transferring data; the drives of two others were relatively quiet. As soon as half-height floppy drives become more readily available, Corona will offer two in the space normally occupied by one full-height



The Corona family: Portable PC and desktop Corona PC

drive. This will permit you to add a hard disk without sacrificing one of the floppy disk drives.

The Corona power supply is a 110-watt unit (almost twice the 63 watts provided by the IBM PC but not quite as large as the IBM PC XT's 130-watt unit), and it can be switched from 110 volts to 220 volts to permit operation almost anywhere in the world.

Keyboard and Monitor

The Corona features the Key Tronic copy of the IBM PC keyboard, which has a different feel, a very light touch that can promote rapid typing, although some users may find it disconcertingly "soft." It also offers LED indicators on the <CapsLock> and <NumLock> keys to provide a quick indication of when these keys are activated. The keyboard has two position adjuster feet in the back to adjust its angle.

On the negative side, the Key Tronic keyboard retains some of the shortcomings of the IBM PC keyboard: the strange positioning of the left <Shift> key and the <ENTER> key, along with symbols instead of words for Tab, ENTER, Shift, and Backspace. Changing the keyboard layout to match that of the IBM Selectric typewriter would be welcome, and it might also help to have the F, the J, and the numeric keypad 5 more deeply indented to assist the touch typist in finding the home position.

Hopefully, both IBM and the companies making compatibles will soon opt for the more logical horizontal layout of the function keys utilized by most of the new 16-bit microcomputers. Horizontal layout makes it easier to display the definitions of all the function keys on the screen. But until IBM makes that change, Corona will probably keep the IBM-style keyboard to retain maximum compatibility. This layout is at least easy and comfortable to work with for extended periods.

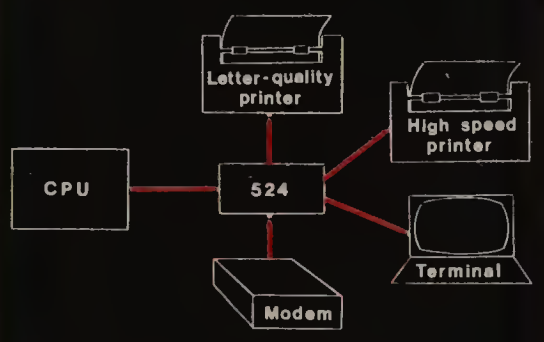
The keyboard attaches below the front of the chassis via a coiled 6-foot cord, an arrangement that allows greater separation between the keyboard and the main processing unit than is possible with the IBM PC rear keyboard attachment system.

Perhaps the Corona PC's most noteworthy feature is its monitor, with its advanced graphics and character resolution capability. The 8- by 8-dot character resolution of the monochrome monitor driven by the IBM Color/Graphics Adapter is difficult to look at for any length of time. By coinparison, Corona has chosen to provide particularly high-quality characters on a high-contrast, high-

SERIAL PORT EXPANDER AND MORE



BTA's MODEL 524 MULTIPORT CONTROLLER is a code activated one to four serial port expander — but that's not all since it has separate and independent UARTS, buffers and handshaking each port can operate with a different configuration, i.e. different baud rates, stop bits, etc. These features also permit two or more devices to communicate with the 524 simultaneously.



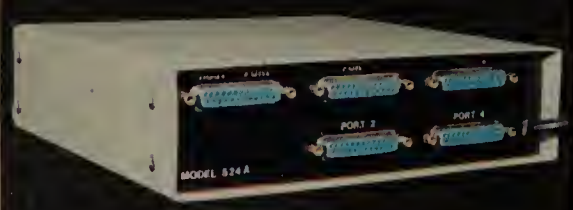
Full duplex with EIA RS-232 protocol

Baud rates up to 19,200

Expansion to 16 ports by cascading

Peripheral ports may be configured by user software

One year warranty



- **MODEL 524 . . . . . $249.00**
- **MODEL 524A $279.00**
  same as model 524 except has 256 byte rx/tx buffers per port
- **MODEL 524 D $269.00**
  same as model 524, plus continuous polling of each peripheral device for data transfer requests. The device is automatically connected when its 'turn comes up . ON, BUSY and OFF messages are sent to the peripheral device.
- Other models available — Contact us or your dealer for additional information.

BAY TECHNICAL ASSOCIATES, inc.
HIGHWAY 603, P.O. BOX 387
BAY ST. LOUIS, MISSISSIPPI 39520
(601) 467-8231
Reader Service #374

resolution, nonglare, P-31 phosphor screen (the type with the fastest refresh). With a character font of 14- by 13-dot resolution in a 16 by 13 matrix, Corona surpasses virtually all other currently available personal computers with the possible exception of the more expensive NEC Advanced Personal Computer. I found the Corona monitor easy to read and have not experienced eye fatigue, even after extended periods of use.

To accommodate such high-character resolution, Corona simply uses a larger ROM, allowing actual control over every dot within the 16 by 13 matrix. By always lighting up two adjacent dots, the vertical and horizontal strokes of the characters can be balanced, thus allowing a gradual shifting of dots and very smoothly sloping characters. This high resolution is particularly evident in the smooth, tight curves of the lowercase characters. Corona has also eliminated conflicts between various character attributes, thus enabling characters to be displayed in any combination of attributes including underlining, blinking, high intensity, and reverse video.

As much an improvement as the character resolution is the enhanced graphics of the standard 12-inch Corona CRT. Corona permits graphics and text to be displayed on the screen at the same time, and it permits very fine resolution of images, including representations of photographs. With Corona's graphics storage in main memory instead of an RS-232C serial port, several images can be stored at the same time, and those images can be swapped rapidly on the screen.

It is currently necessary to install an IBM PC-compatible color board to connect a color monitor. Of course, the same is true for an IBM PC equipped with a monochrome monitor.

Portable PC—to Go

Corona is taking a jump on the market by offering both a tabletop and a portable model with virtually the same features and capabilities. The portable, which is heavy enough at 28 pounds to more properly be called a "transportable computer," differs from the tabletop model only in its smaller (9-inch) monitor and in its inability to mount the Corona full-height hard disk internally. In all other respects it matches its desktop brother feature for feature, including its 512K maximum RAM capability and space for four full-sized IBM PC-compatible expansion boards. With the same graphics and character resolution on the slightly smaller screen, the characters look a little better than those on the monitor of the desktop model.

Corona has chosen an unusual approach to dealing with the keyboard of its portable. Instead of designing a special keyboard that would act as the front cover, it has used the same slender keyboard as the tabletop model, which may be enclosed, along with a number of floppy disks, within a detachable 3.81-inch-thick cover. The entire unit is then transportable.

The portable is ruggedly constructed; the CRT and the disk drives are shielded from one another by metal partitions. The molded plastic outer chassis is split horizontally, and the top portion can be removed by loosening the two screws that attach it to the front piece and the two screws that attach it to the rear panel. To gain access to the expansion slots and the memory sockets, you must remove the six sheet-metal screws that attach the left side cover of the internal metal chassis. While this whole process will take much longer than with the tabletop model, it can be done easily and relatively quickly.

The expansion slots in the Corona portable are arranged front to back as in the desktop model and are located directly over the memory sockets. The portable is also equipped with adjustable, vertical rear card supports. Slots in the plastic front piece provide efficient cooling by allowing air to be drawn into and around the expansion cards and then out the rear, past the mounting brackets.

The portable uses a different type

How Compatible Is This Compatible?

Perhaps the biggest question facing a prospective IBM PC-compatible computer buyer is that of software and hardware compatibility. The Corona is designed to run the software available for the IBM PC from third-party vendors. In fact, Corona is committed to full compatibility with the Documented IBM PC Standard.

In its premier issue (see "How Compatible is Compatible?" Vol. 1, No. 1) *PC World* developed the following classification scheme to rate computers on their compatibility with the IBM PC.

Level 1: Media compatible. Machines that have the ability to read and possibly to write disks in the format used by the PC.

Level 2: Processor compatible. Machines that use an 8088 microprocessor or an 8086. While the two microprocessors are functionally identical, the 8086 can perform some operations more rapidly, which may cause problems for timing-sensitive programs.

Level 3: Operating system compatible. Computers that support MS-DOS, CP/M-86, or some other popular PC operating system.

Level 4: Component compatible. Machines that can use plug-in circuit boards designed for the PC.

Level 5: Character set and keyboard compatible. Machines that display the same characters as the PC for each of the 256 character codes and that have keyboards that include all the same keys as the PC's.

Level 6: Video compatible. Machines that use the same video interface as the PC. The video must be memory mapped and located at the same memory addresses used in the PC.

Level 7: System compatible. Machines that duplicate the PC's entire architecture. RAM, ROM, I/O, and all other addresses reside in the same locations as those in the PC, including the routines in the BIOS ROM.

The Corona PC and Portable PC come close to attaining Level 7 compatibility, but due to the BIOS ROM, they must be rated at Level 6. In fact, the Level 6 rating is absolutely valid in monochrome mode but requires an IBM-compatible color graphics board to be at Level 6 in the graphics display mode.

The Corona offers improved monitor resolution of 640 by 325 pixels (versus 640 by 200 for the IBM PC). To accommodate the same memory-mapped locations as the IBM PC, the Corona simply multiplies the Y-axis of the point to be plotted by 1.6, which is done through one instruction for the 8088 CPU.

Another important area that must be supported without impinging on IBM copyrights is the contents of the ROM BIOS. One of the problems here is that the version of MS-DOS supplied by Microsoft to manufacturers other than IBM is assembled to run in a slightly different location from IBM BIOS. Corona had to make modifications in DOS in order to preserve a compatible ROM communications area. It has also supplied equivalent functions for disk copy utilities, disk compare utilities, and mode utilities.

In fact, the only basic point of operational variance from the IBM PC is that Corona can't offer the IBM-copyrighted ROMs. But by preserving the same entry points into DOS, it is able to preserve compatibility with most third-party software.

Still, not all IBM PC software will run on the Corona without modification. A few software publishers have brought out their initial offerings for the IBM PC without accurately following the Documented IBM PC Standard. One such example is the first version of Lotus *1-2-3*. Running this program on the Corona requires a copy of PC-DOS. (Also, at this time an IBM PC-compatible color graphics board is required to view the graphics output of *1-2-3*.) Future versions of *1-2-3* should correct this situation, as Lotus, like most manufacturers of 16-bit software, is making special efforts to ensure that its products will run on the widest possible range of 16-bit computers.

---

of monitor with an etched antiglare screen, although it still has a P-31 phosphor. Like its larger brother, it is very readable, with 14 by 13 characters in a 16 by 13 matrix.

The 9.6- by 18.8- by 19.8-inch dimensions are par for the course in this stage of development for full-featured transportable computers, and you should be able to take it on the plane with you—if you're persuasive. Being able to take the computer home from the office should soon convince many users to opt for the portable model. Corona also offers a nylon tote bag to make carrying the Portable PC a little easier and to provide a little additional protection.

At $2545 with one double-sided floppy drive ($2945 with two drives),

Review

128K memory, MS-DOS, GW BASIC, *PC Tutor,* and the *MultiMate* word processing program, the Corona Portable PC is a cost-effective alternative to the IBM PC or the COMPAQ (which costs $2995 with one disk drive and no bundled software).

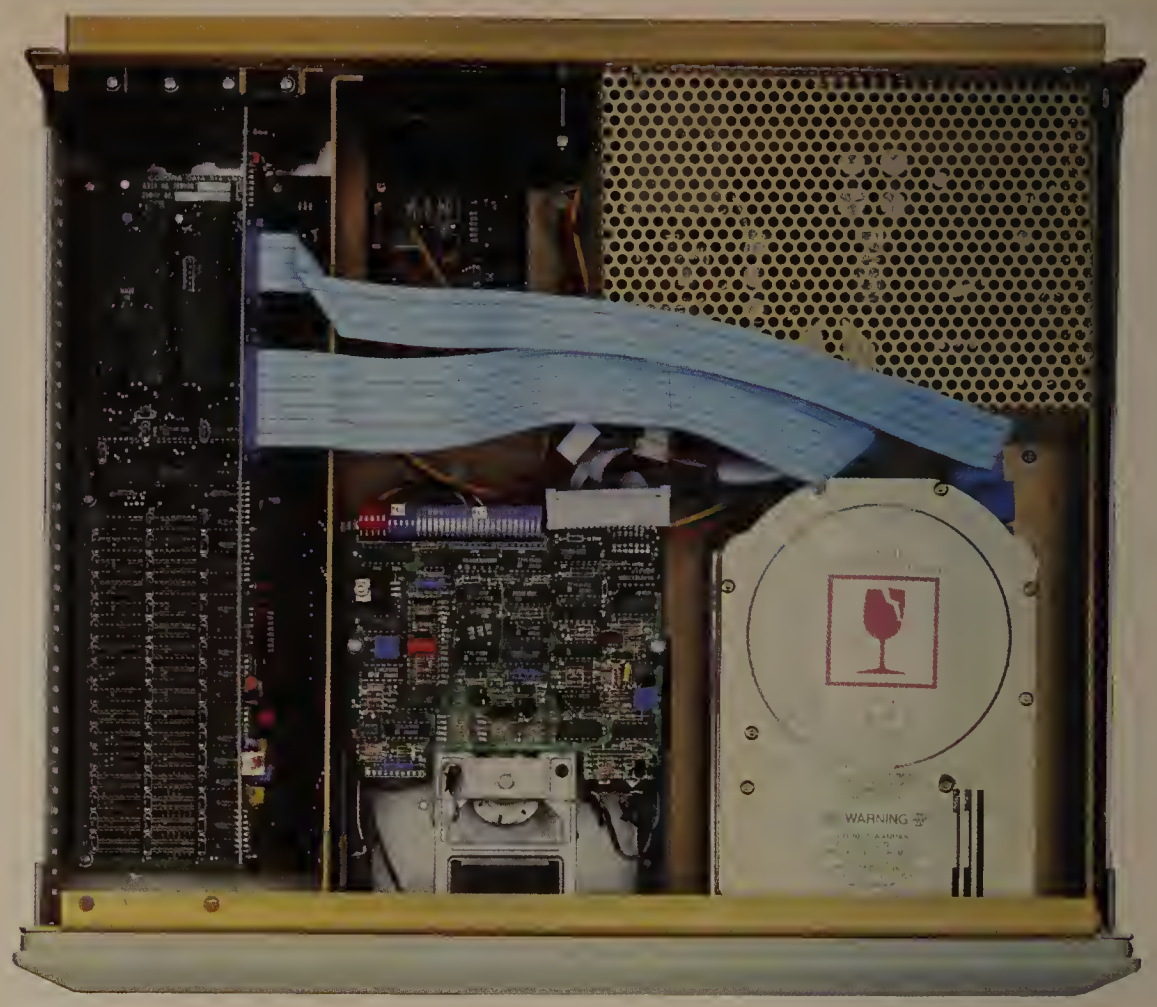
Bundled Software

Corona has modified MS-DOS, as mentioned previously in this review, to correspond more closely to PC-DOS. The distribution disk that contains MS-DOS (called Corona-DOS in this case) also includes several interesting utilities that extend beyond the capabilities of MS-DOS version 1.25 (equivalent to PC-DOS 1.10). For example, the CONFIG utility can set up the computer to utilize either one or two floppy disk drives, up to four virtual disk drives on the hard disk, and a user-definable RAM disk. Normally, drives A and B are configured for floppies, C through F as virtual drives on the Winchester, and G as a RAM disk. This configuration is not mandatory, however, and CONFIG can even set up the hard disk drive as A through D. The addition of the RAM disk is a real plus, particularly with the 512K memory expansion capability. However, if the RAM disk configuration is used in a 128K system, *MultiMate* won't run, since it requires the entire 128K.

One interesting utility shows rows of memory chips on the screen and goes through a process of checking the individual chips for errors. If errors are found, the bad chip or chips and their exact position in the motherboard RAM array are graphically illustrated on the monitor.

The EQUIP utility provides a summary of system configuration. Other utilities streamline hard disk usage; some of these change the size of the hard disk partitions and back up data to floppies by date, subject, or disk partition.

Corona has also included some demonstrations of its improved graphics capabilities, an adventure



Internal view of the desktop Corona PC's mechanical assembly

Hardware and Software	IBM PC[1]	Corona
System unit with keyboard, 64K memory,[2] and two double-sided disk drives	$2633	$2995
Additional 64K memory[2]	165	included
Monochrome monitor	345	"
Monochrome adapter and parallel port	335	"
Serial port	120	"
DOS and BASIC[3]	60	"
Electronic disk drive emulator	30	"
Total cost of standard Corona vs. an equivalent IBM PC	3688	2995
Additional 384K memory[4]	1175	885

[1] Prices for IBM PC hardware and software are IBM Product Center prices.
[2] The Corona does not use parity check bit in memory.
[3] Corona supplies MS-DOS 1.25 and GW BASIC.
[4] The Corona system board will hold 128K to 512K memory in 128K increments. The new IBM PC system board will hold 64K to 256K memory in 64K increments (except for the electronic disk drive emulator, which is not supplied by IBM but is often free with a memory expansion board). Additional memory requires a memory expansion board and use of one expansion slot.

IBM PC and Corona PC hardware and software price comparison

game, a strategy game, and some other simple diversions. There is even a program that turns your Corona into a simplified synthesizer, although the speakers are not loud enough to take full advantage of this feature.

The *PC Tutor* program included with the system guides first-time users through the intricacies of using the Corona [see "Self-Training on the PC," *PCW,* Vol. 1, No. 3]. This instructional program is particularly helpful since the documentation explaining MS-DOS and the various offered utilities, though quite complete, is printed in small type and is difficult to wade through. In the MS-DOS documentation each command is on a separate page arranged in alphabetical order. While that order is good for referencing commands, it is not the logical order for the first-time user learning about MS-DOS.

The Corona PC user guide, on the other hand, is in bigger print and is easier and more logical to use.

For the BASIC programmer, there is a separate package containing the disk and the documentation for Microsoft's GW BASIC (graphics included), which will allow programmers to use Corona's improved graphics capabilities. At this time it is necessary to use an IBM PC-compatible graphics board to view IBM graphics programs on screen; however, all graphics programs written in GW BASIC should be able to run without a hitch and should make full use of Corona's improved graphics.

The *MultiMate* word processor bundled with the Corona was designed to duplicate the features and ease of use of the dedicated Wang word processor. *MultiMate* is easy to learn and is quite powerful, with a full helping of worthwhile bells and whistles [see "The PC's Perfect Mate," *PCW,* Vol. 1, No. 6 for an in-depth review].

Sales and Service

Corona markets its products through a network of regional full-service distributors who in turn retail the products through a network of authorized Corona dealers (qualified by both the distributors and Corona). This approach is unusual: most other manufacturers sell directly to authorized dealers or sell to distributors who supply the product to an uncontrolled marketplace. Corona hopes that the distributors will be able to provide close regional support and stocking, allowing the dealers to do an effective job of supporting the product.

Once the warranty period has run out, Corona owners may use the Xerox Corporation service organization, which currently includes 82 nationwide Xerox Computer Centers for walk-in service, on-site service, or pickup and delivery.

Except for the excessively noisy disk drives and fan, a different keyboard feel, and a small degree of incompatibility, Corona presents a convincing argument for purchasing an IBM PC-compatible computer instead of the original. The combination of greater power and expandability, improved character resolution and graphics, bundled software, and most important, the low price, is likely to persuade many prospective buyers to turn their eyes away from the giant and toward computers like the Corona PC and the Corona Portable PC.

David Keith is a freelance journalist and microcomputer consultant.

Corona PC, Corona Portable PC
Corona Data Systems
31324 Via Colinas #110
Westlake Village, CA 91361
800/621-6746

List price including bundled software: Corona PC, $2595 with one double-sided floppy drive, $2995 with two drives, $4495 with one drive and one 10M Winchester. Corona Portable PC, $2545 with one double-sided drive, $2945 with two drives.

Designed For The Future

Available Today!

VENTURE

Financial Planning And Analysis Software

VENTURE.REPORTS



- Income Statement
- Percent of Sales
- Detailed Income St.
- Cash Flow & ROA
- Present Value Analysis
- Sensitivity Analysis
- L.T. Assets
- Working Capital
- Balance Sheet
- Financial Ratios

The New Tool For Financial Planners

It's on-Line NOW / Forecasts the profitability of proposed and existing business situations / Performs Business Planning, Strategic Planning, Capital Investment Analysis / - You simply specify parameters, enter data / Provides ten all encompassing reports /- Built in equations, logic and accounting procedures / Priced at $495 / For your IBM PC.

write or call (201) 530-9260.

WEISS ASSOCIATES INC.
127 Michael Drive, Red Bank, NJ 07701

SEND IN the coupon — GET BACK our detailed brochure

Company:
Name:
Title:
Address:

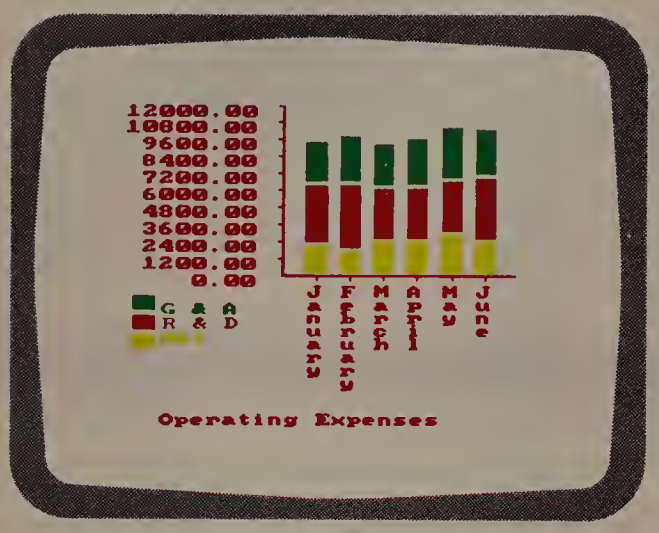
Companies interested in the future have an interest in VENTURE

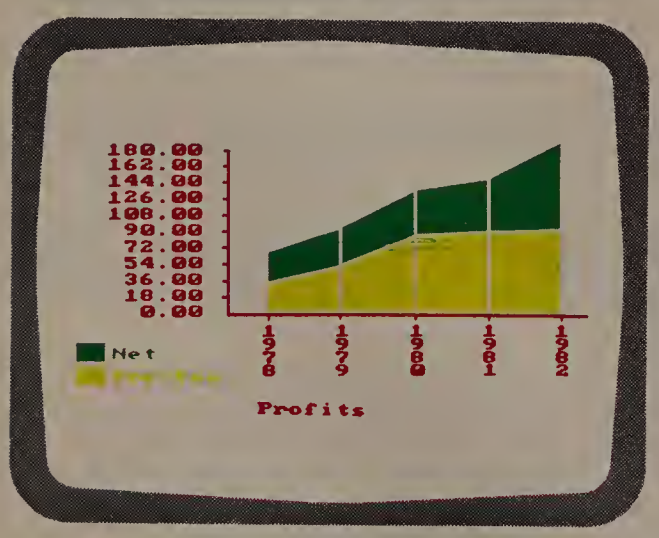
VENTURE
WEISS ASSOCIATES INC.
127 Michael Drive, Red Bank, NJ 07701

Reader Service #357

Good News for VisiCalc® Users







Required hardware: IBM or COMPAQ P.C. with 128K RAM and at least one 5-1/4" diskette drive. For screen graphics: IBM Color/Graphics Adapter and compatible color or monochrome display. For printer graphics: IBM or Epson printer with GRAFTRAX option and IBM Color/Graphics Adapter.
Required software: IBM DOS, Version 1.1 or Version 2.00; VisiCorp VisiCalc, Extended Memory ("256K" or "512K") Versions, or IBM VisiCalc, Version 1.10 or greater.

A SUPERIOR INTEGRATED SOLUTION

Our **StretchCalc** product adds two dozen new commands to VisiCalc. Compared to other leading integrated products you obtain:

— More kinds of charts and graphs with superior quality
— Easier to use because you type fewer keystrokes
— The ability to easily program the function keys
— Faster sorting and report generation

The **StretchCalc** program uses a sophisticated operating system technique to add three major sets of features to your VisiCalc:

- **GRAPHICS:** Eight kinds of charts and graphs allow you to uncover important trends and patterns behind that mass of numbers. View the graphics in your choice of color or monochrome. Or print them. Either way, you gain immediate impact from your data that those rows and columns just can't provide.

- **SORTING & REARRANGING:** Need to examine your budget, portfolio, or sales forecast by relative value of spreadsheet entries? **StretchCalc** SORT commands automatically rearrange your spreadsheet based upon its contents. Would you like the convenience of obtaining a single-page summary of a large spreadsheet with a single command? A REARRANGE command lets you instantly set the columns of your spreadsheet in any order.

- **KEYSAVER™ COMMANDS:** Store a series of VisiCalc commands under a function key. One keystroke and the **StretchCalc** program executes them for you. Up to 66 sets of VisiCalc and **StretchCalc** commands can be stored in a single diskette file. No more memorizing the right sequence or recovering from costly keystroke errors.

The price is more good news. **StretchCalc** Version 1.3 has a suggested retail price of only $99. And coming very soon is Version 2.0. It adds many new features including data retrieval. It will be available as a low-cost upgrade to Version 1.3 customers or separately at a suggested price of $139.

Need more information? Call toll free at (800) 322-4110 or in Oregon call (503) 626-4727. We'll provide you with the name of a dealer so you can see for yourself just what you're missing.

Attention New Software Retailers: Call us for information on our Dealer Support Package.

StretchCalc is a trademark of Multisoft Corp.; IBM is a trademark of International Business Machines Corporation; VisiCalc is a VisiCorp trademark; GRAFTRAX is a trademark of Epson American, Inc. COMPAQ is a trademark of COMPAQ Computer Corporation.

MULTISOFT

MULTISOFT CORPORATION
14025 S.W. FARMINGTON RD., BEAVERTON, OR 97005



Burned By Pirates?

PROLOK™

SOFTWARE PROTECTION DISKETTE

Don't let unauthorized copiers put a match to your profits.

The PROLOK Software Protection System is powerful, low-cost insurance against piracy.

Tough To Break

Created by a special, patent pending manufacturing process, each PROLOK Diskette is unique.

The PROLOK Protection System provides multi-level security, rendering mass by-pass schemes such as bit or nibble copiers ineffective.

Easy To Use

PROLOK Protection is invisible to the legitimate user. Back-up with normal system utilities. Protected files may be transferred to and from hard disks.

Stop your profits from going up in smoke. Call, or send $9.95 for your PROLOK Evaluation Diskette and start protecting your bottom line.

Vault Corporation
2649 Townsgate Road, Suite 500
Westlake, CA 91361
(805) 496-6602, ext. 222

California residents, please add 6% sales tax

PROLOK, PROLOK Software Protection Systems PROLOK Diskette and PROLOK Evaluation Diskette are trademarks of Vault Corporation
© 1983 Vault Corporation

Reader Service #278

Don't get a new desk just because you bought a computer!



To keep pace with the rigors of your business, you need the gh-tech capabilities of your personal computer. But you don't ed a bulky system unit taking up valuable space on your desk. Lifeline Executive Tower moves that unit from your desk to ur floor, giving you more room to work. Lifeline Towers are ailable in two solid hardwood models—Executive Oak and ecutive Walnut—and Standard High-Impact Plastic, with ices starting below $200. Towers constructed of other hard-woods can be special-ordered. Also available are Executive Monitor and Printer stands and monitor/keyboard extension cables, all priced under $100. Lifeline Towers are designed to fi IBM PC, XT and IBM expansion chassis, as well as DEC Rainbow and DEC 350.

Ask for Lifeline Towers at a participating dealer. Or order direct by writing or calling:

Lifeline Information Systems, Inc.
P.O. Box 766 Sandy, Utah 84091 801 566-5340

IBM Trademark IBM Corp.

Reader Service #284

Make your micro work like a mainframe.

First, neatly tape the "370" label onto your IBM Personal Computer.

Now slip a dBASE II® disk into your main drive.

That's it: your IBM PC is now ready to run a relational database system, the kind IBM put on their mainframes last year.

And you're ready with more data handling power than you would have dreamed possible before dBASE II.

With a word or two, you *create* databases, *append* new data, *update*, *modify* and *replace* fields, records and entire databases. *Display* any information, *report* months worth of data in minutes and *zip* through input screens and output forms.

You can use it interactively for answers right now. Or save your instructions and repeat everything with two words: *do Manhours*, *do Project X*, *do* whatever has to be done.

To try dBASE II free for 30 days, drop by your local computer store. Or if they're sold out, call us at (213) 204-5570. If you don't like it, you get your money back.

But if you do that, you'll have to remove the label. Because nothing short of a mainframe works like dBASE II.



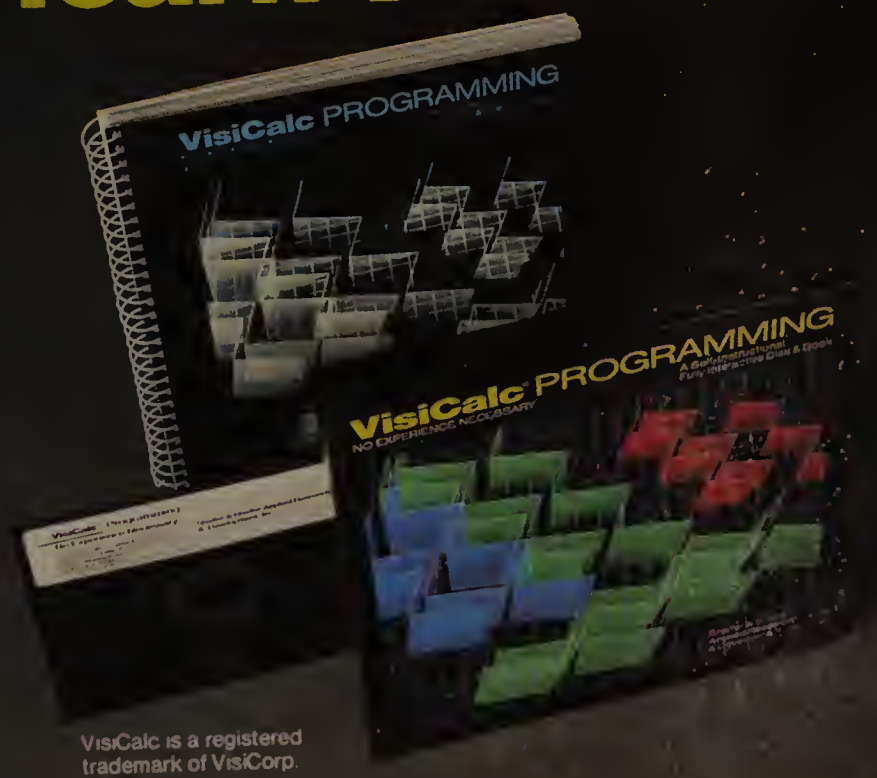


ASHTON·TATE

Reader Service #335

©Ashton-Tate 1983
dBASE II is a registered trademark of Ashton-Tate.

Simply the best way to learn VisiCalc®



VisiCalc is a registered trademark of VisiCorp.

The best way to learn VisiCalc® is to use it. The last thing you need is another book. Or gimmicks like audio or video cassettes. Or programmed simulations that only teach you about simulations.

VisiCalc® Programming: No Experience Necessary is different. It's the only self-instructional disk-and-guide that actually *uses* VisiCalc to teach it. So you learn VisiCalc while using VisiCalc. Right at the computer. Right from the start.

Step-by-step exercises provide immediate hands-on experience beginning with the basics and progressing through advanced VisiCalc functions. When your computer screen matches the illustrated Checkpoints™ in the guide, you're ready to move on. Make a mistake, no problem. At the touch of a key you're back to your last correct checkpoint. As you pass checkpoint after checkpoint your confidence quickly grows. And so does your mastery of VisiCalc. All while building a real world Profit Analysis model completely from scratch.

In addition to the program disk, you get an indexed guide so you can review any part of the tutorial at any time. And a handy reference card lets you find any VisiCalc command instantly. As a bonus, you get five ready-to-run programs to add to your library: Time Management, Future Cash Flow Analysis, Portfolio Valuation, Retirement Planning, and a Loan Repayment Scheduler.

An incomparable value at only $59.95, *VisiCalc Programming: No Experience Necessary* unlocks the power of Visicalc and lets you get down to business—*fast.*

To order, see your dealer or bookseller. You may also charge it by phone at 1-800-343-9402 or write to us at:

LITTLE, BROWN AND COMPANY
34 Beacon Street, Boston, MA 02106

Versions available for the IBM PC, Apple II/II+/IIe, Atari 800/1200XL, and TRS-80 Model III. VisiCorp's VisiCalc program must be purchased separately.

Reader Service #383

THE EASY CHOICE



Best Separate Compilation – Best Error Handling – Best Implementation on a Small Computer

Comments From 1983 LA AdaTEC Compiler Faire

". . . JANUS/Ada encompasses at least 5 times as much of Ada as Supersoft, including many of the more exotic features of the language." Creative Computing

". . . The compiler performed exceptionally well . . . the linker performs flawlessly . . . the error handling is excellent . . . RR's support is the best I've ever encountered." InfoWorld

"The compiler breaks new ground in the microcomputer field with its excellent runtime error-checking code and its excellent compiler error messages." Microsystems

"They're (RRS) honest to a fault, so they call their language JANUS; but its more nearly Ada than any other microcomputer implementation I know of . . . I watched some of the demonstrations and it works." Jerry Pournelle, Byte

Encouragement of this kind deserves a just reward; we now intend to complete our compiler and submit it for validation.

Our Ada line is available on the following operating systems: CP/M, CP/M-86, MS-DOS, PC-DOS and CCP/M-86

Available from the following distributors:

Westico, Inc.
25 Van Zant, St.
Norwalk, CT 06855
(203) 853-9880

Marfam Corporation
5340 Thornwood Dr. Suite 102
San Jose, CA 95123
(408) 226-0170

Suntex Data
10175 Harwin Suite 100
Houston, TX 77036
(713) 271-9191

Internationally

S-100 Systems
3687-4 Shobumachi
Obayashi
Saitama, Japan 346-01
04808 (5)0416:
04808(5)6565

Micronix
11 Blackmore St.
Windsor 4030
QLD. Australia
(07)57 9152

Nord-Micro Informatique
155, rue du Fauburg St.
Denis
75010 Paris
(1)205-39-47

CP/M, CP/M-86, CCP/M-86 are trademarks of Digital Research, Inc.
*ADA is a trademark of the U.S. Department of Defense
MS-DOS is a trademark of Microsoft

©Copyright 1983 RR Software

RR SOFTWARE, INC.

specialist in state of the art programming

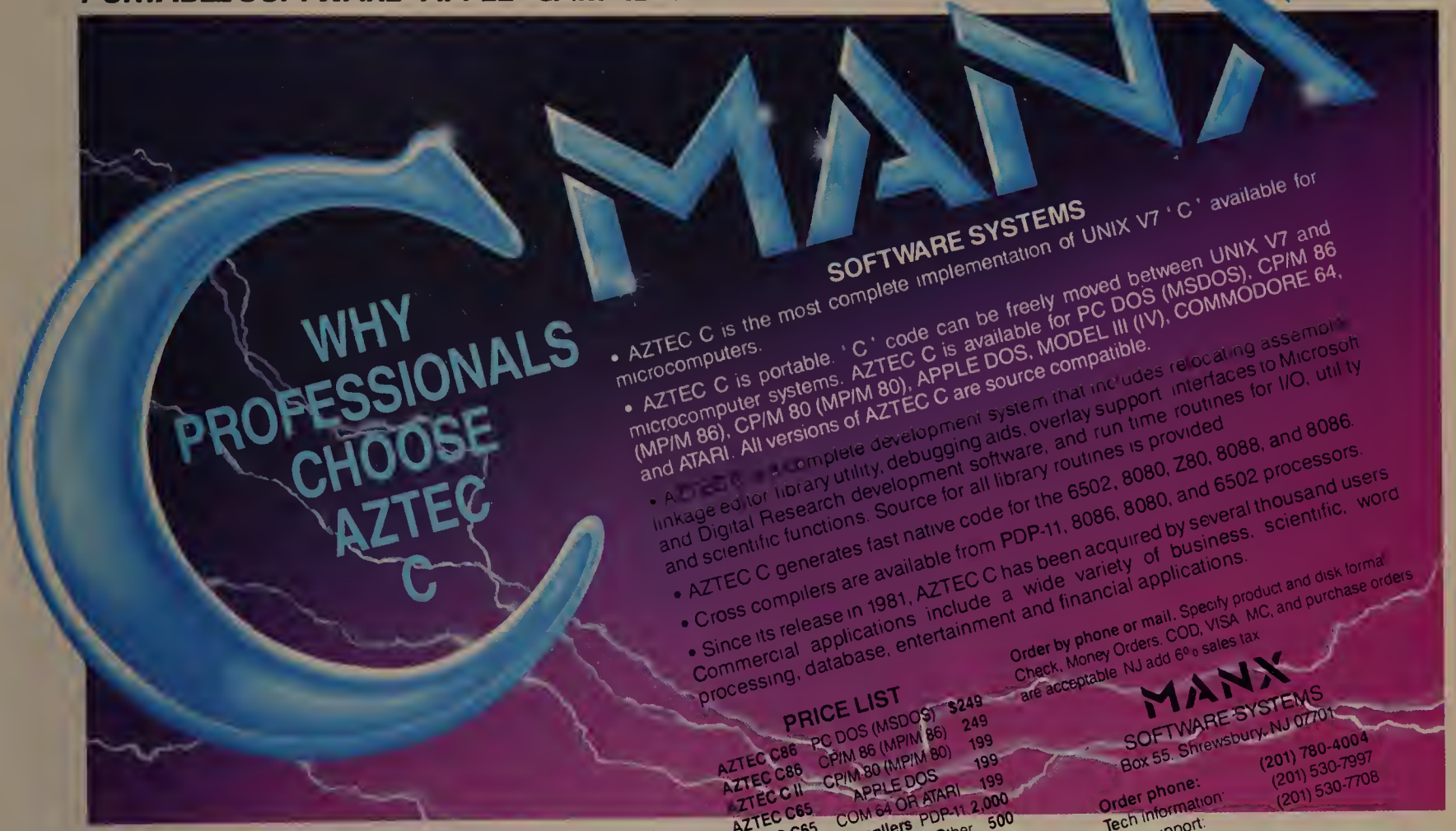
P.O. Box 1512 Madison, Wisconsin 53701

(608) 244-6436

Reader Service #331

AZTEC C — ' C ' PROGRAM DEVELOPMENT SYSTEM

PORTABLE SOFTWARE APPLE CP/M IBM



Shipping: COD, 2nd day delivery, or Canada, add $5. Canada 2nd day or US next day delivery, add $20. Outside North America, add $20, and for 2nd day add $75.

Reader Service #408

The Smartest Tutorial On The Market!

Congratulations! Now that you have graduated to the hardware level, let Sophco help you master the software level, with our brilliant DOS Tutorial. Designed to educate you easier, faster and more economically than ever before, the DOS Tutorial is programed to teach you what DOS is, why you need it, and most importantly, *how to use it!*

EASY & ENTERTAINING: Sophco's DOS Tutorial is **completely menu driven,** allowing you to quickly and effectively read about any command you wish to learn about. Plus its extensive use of **graphics and sonics** makes it interesting and fun to use, unlike those dry and cumbersome manuals. It also . . .

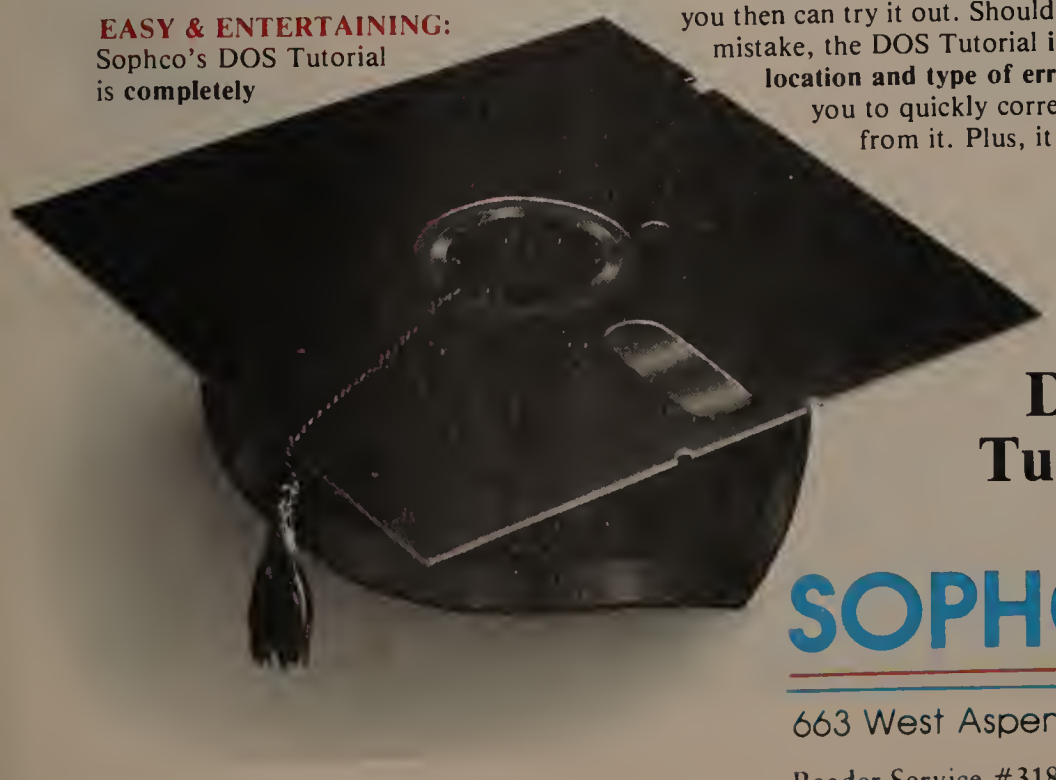
CURES FRUSTRATION: The DOS Tutorial is **user interactive** — after you have read about a command (such as Format), you then can try it out. Should you make a mistake, the DOS Tutorial **identifies the location and type of error,** allowing you to quickly correct and learn from it. Plus, it can be used for . . .

QUICK & EASY REFERENCE: Designed by specialists, the DOS Tutorial also has an **extensive glossary** which helps you understand the underlying concepts such as BOOT, BINARY FILES, RAM & ROM and many more — all clearly explained. This feature, along with the **random access to all commands,** makes the DOS Tutorial a reference tool that can be used over and over again. Plus it's . . .

COMPATIBLE: The DOS Tutorial is designed for problem free teaching through the IBM Personal & IBM Personal Computer XT, as well as the TI Professional Computer. And it's . . .

ECONOMICAL: Sophco's DOS Tutorial is a smart buy at only $39.95, and the new DOS 2.0 Tutorial is available at only $49.95.

So, after studying your options, and comparing all the prices on the market you can see why Sophco's DOS Tutorial is at the top of it's class. If not available at your local dealer, simply mail check or money order today!



DOS Tutorial

SOPHCO

Dealer Inquiries Invited

663 West Aspen Way, Dept. W-2, Louisville, Colorado 80027

Reader Service #318

Easy Writing

A look at Information Unlimited Software's professional word processing program, EasyWriter II

Andrew T. Williams

If you want to know what it's like to climb a mountain, ask a Sherpa; if you want to know what it's like to use a word processing program, ask someone who used it to write a book. As far as mountains go, I'm from Kansas. But I'm Sir Edmund Hillary himself when it comes to talking about *EasyWriter II*.

I just finished writing a 750-page manuscript with *EasyWriter II,* and climbing Mount Everest couldn't have been more challenging—or rewarding. I've used just about every feature the program has to offer, so I know the locations of the dangerous cliffs as well as the safe route to the clear and cold air at the top.



Features

Detailing all features of *EasyWriter II* would be impossible, but you should know that it is a menu-driven, full-featured, page-oriented word processing program. The program has two main sections, System and Housekeeping. Housekeeping performs several functions necessary for running the program. Figure 1 shows the System (or main) menu from which you move directly to word processing tasks. To make a selection from the menu, type the number of your choice and follow the directions as they appear. If at least one of your

disk drives is double-sided you can store both the System and the Housekeeping programs or the System and *EasySpeller II* programs on the same disk. If you have only single-sided drives, the programs must be stored on separate disks.

EasyWriter II is page oriented. You work on a single page at a time, and when you want to work on another page, you move there by using the Next or Previous commands or by entering the number of the page you want and issuing the Goto command. Page orientation means you'll never have to scroll through a long document again. When drafting a manuscript, you can put more than 100 lines on a page before you have to move to another page. Once you've completed the draft, you run the manuscript through the pagination function to arrange everything into page-long units.

EasyWriter II lets you choose the "mode" in which to operate: character, word, line, sentence, paragraph, block, or page. Whichever mode you're in (its name is displayed in the upper-left corner of the screen), the Copy, Delete, Insert, Cut, Next, and Previous commands work at the level of that mode. If you're in paragraph mode, the Next command, <F10>, takes you to the beginning of the next paragraph. In sentence mode, <F10> moves the cursor to the beginning of the next sentence.

An important feature of *EasyWriter II* is that the text you see on the screen is the same as the text that prints out on the page. Underlined text is underlined, boldface text is displayed in double-strength video, and headers and footers appear on the page. If you've chosen to justify both the right and left margins, the text is justified on the screen.

Robust Ruler

EasyWriter II allows you to store format specifications in a file called a ruler. When you press <Shift>-<F1> the ruler appears, ready for editing (see Figure 2). You can name rulers so that they can be called from anywhere in a document or from other documents in the same folder. You can use the ruler to set the right and left margins or justify the right margin. Pages can be up to 256 characters wide, and you can set regular and decimal tabs. *EasyWriter II* sets the *C* that indicates the center line automatically, but you can position the *C* where you wish. You can choose the character pitch (10 for pica, 13 for condensed, and 6 for enlarged) and the number of lines per inch (3 lines per inch for double spacing and 6 for single spacing).

You can also declare the ruler nonadjusting: with a nonadjusting ruler everything is printed as typed; text is unaffected even when the Adjustment command is given.

I modified the default ruler to reflect the type of work I do. I always use <Shift>-<F1> to create a ruler named *d,* for default. Whenever I want to go back to my original margins, tabs, line spacing, and character size, all I need to do is press <Shift>-<F1> and *d,* and the ruler is reset. You can leave a ruler unnamed, but I name every ruler I think I might have any reason to use again. To get a listing of all the named rulers in a document, use the main menu's option 7, Print Document List.

Functional Function Keys

EasyWriter II uses the IBM PC function keys extensively, giving the program the ease of use of a dedicated word processor (see Table 1 for a list of the key assignments). The program comes with a sticker to attach to the keyboard that explains how the keys are used, but memorizing the more frequently used keystrokes is not difficult.

You can adjust text from the cursor position to the end of the current paragraph with <F8> or you can adjust an entire document with the Adjust option of the pagination function. Adjustment eliminates unnecessary spaces between words and prevents words from hanging over the right margin. If there is some part of the text that you don't want adjusted (a sonnet for example), use the nonadjusting ruler.

In some situations you may want to override the Adjustment program on a character-by-character basis. This is done by specifying "nontrivial blanks," or necessary spaces such as paragraph indentations. To indicate these blanks you can use the tilde (*EasyWriter II*'s default character) or specify your own symbol. I use the reverse single quote because it's a lowercase letter and because several of the programs I write about require the tilde. The nontrivial blank symbol shows on the screen, but it doesn't appear in a printout. With this feature you can indent paragraphs or center material and have the indentation and the centering remain after adjustment.

> The text you see on the screen is the same as the text that prints out on the page.

Like most professional word processing programs, *EasyWriter II* has a set of tools for moving text from one place to another in a document. It has the standard cut and paste features found on most programs, and in addition it allows you to copy a section of text as many times as you wish. For example, I typed "*EasyWriter II*" once at the beginning of this article, copied it, and then inserted it by pressing <Alt>-<F5> wherever I needed it throughout the document.

EasyWriter II has a "tagging" feature that lets you mark segments of text for modification. Once text (up to 4000 characters) is tagged,

you can merge it from one part of a document to another or from one document to an entirely different one that isn't even on the same disk. When writing my book, I used one document for the text in a chapter and another for the tables. I tagged the tables, and when I needed to assemble the two documents into a single chapter, only a few minutes of merging were necessary.

Easy Indeed

Information Unlimited Software has made every effort to make *EasyWriter II* an easy-to-learn, easy-to-use program. I've already spoken about the menus and the ease with which you can make choices or change parameters, but the program has other easy features as well.

Document names can be up to 30 characters long, for example, and they can be very descriptive. You no longer need C-3PO, the gold-plated robot from *Star Wars* who knows 6 million languages, to translate your file names. But easy doesn't stop there. You don't need to type document names because you refer to documents by number. And complicated keystrokes are a thing of the past; invoking functions is as simple as <F1> for Help and <F6> for Adjust. Underlining is done with the <Alt>-_ combination, and boldface is accomplished with <Alt>-B.

Finally, *EasyWriter II* is part of a larger family of programs that includes *EasyPlanner, EasyFiler, EasySpeller II,* and the soon-to-be-introduced *EasyMailer II*. Each program is designed to work with the others, and each has the same general structure, to make learning a program's special features easier.

> Document names can be up to 30 characters long.

EasySpeller II

EasySpeller II deserves special mention. It's an 80,000-word spelling checker that can be loaded onto the system disk and used anytime you use *EasyWriter II*. You can check the spelling of a single word, a single page, or an entire document. The spelling checker tries to match words from the document against the contents of its word list. If a word you have typed isn't in *EasySpeller*'s lexicon, it stops to ask whether to accept the word as correct for this document, accept it as correct in this one instance, or correct the word. You can exit *EasySpeller II* at anytime by pressing <Esc>.

One shortcoming of *EasySpeller II* is that unlike some spelling checkers it can't learn special vocabulary. *EasySpeller II* stubbornly refuses to recognize the havoc computers have played with the King's English. Every time I checked a chapter of my book, I had to tell it that *spreadsheet, worksheet,* and *VisiCalc* were correct words. *EasySpeller II* doesn't even think *EasySpeller* or *EasyWriter* are words.

Dangerous Outcroppings

While I'm impressed by *EasyWriter II,* a long writing project has suggested a few warnings I would like to pass along. The first is to keep an eye on the "% full" indicator at the top

10% full 06/04/83

Main Menu EW II DOS System 96K 2.0 Dec 11 82 | Select Activity

1. Edit 4. Print 7. Print Document List
2. Open File Folder 5. Paginate Document 8. System Functions
3. Delete Document 6. Set Date

Doc Page Name Auth Op

Active Document: 5 1 EASYWRITER II REVIEW, PCW # 6

List of Documents in Folder LETTERS, MEMOS, ETC.

Doc	Page	Name	Auth	Op	Created	Edited
2	1	Let. Nurock			05/06/83	05/06/83
3	3	Off Shore Banking Program 1983			05/10/83	05/10/83
4	3	Curriculum Vita			05/10/83	05/10/83
5	22	EasyWriter II, Review, PCW #6			05/29/83	06/02/83
6	1	Letter: Paul Chaison, IUS			04/20/83	04/20/83
7	1	J. Blumenthal, Microsoft			02/20/83	04/20/83
8	1	L: D. Littwin/1st draft of ms			05/25/83	05/25/83
9	1	Tables for EasyWriter II Art.			06/01/83	06/02/83
10	1	Theron: Equipment Letter			05/31/83	05/31/83
11	1	L. Press: Cover for MS			06/01/83	06/01/83
12	1	Final things to do to WHAT IF			05/25/83	05/25/83

Figure 1: EasyWriter II main menu

of the screen. This message shows what fraction of the storage space on the current data disk has been used. If you fill the disk and continue to type, the text you type won't be saved, and the text you store could affect the information on the disk in many unpredictable and unfortunate ways. Whenever I see a disk filling up (above 90%), I switch to a new data disk.

A catastrophic problem can occur if you switch data disks when a file is open. If you do so, you'll almost certainly make both the original disk and the new one unusable. This problem can occur at any point in word processing other than when the main menu is displayed. (Switching within the Housekeeping menu is necessary for importing, exporting, copying, and so on, and presents no problems.) So never change data disks except when the main menu is displayed.

The Cancel command, <Shift>-<F2>, must be used with caution. It cancels all changes that you've made to a page since the page was last called from the data disk. This feature works fine if the change you wish to cancel is the only one you've made since loading the page. But if

```
Word                                                    38% full 06/02/83
Space 10 Line  1 Page  1 Doc  9 Tables for EasyWriter II Art.          FULL_
Ruler [        ] from Document [9  ]
 ........1.........2.........3.........4.........5.........6.........7.........8
                              Margins (L,R/J/N)
 ........L.........:.........:.........:.........:.........:.........R.........:
                                  Tabs (T)
 .........:....T....:.........:.........:.........:.........:.........:.........:
                               Decimal Tabs  (D)
 .........:.........:.........:.........:.........:.........:.........:.........:
                                Center  (C)
 .........:.........:.........:.........C.........:.........:.........:.........:
Character pitch: [10] characters/inch.  Line spacing: [3 ] lines/inch
-------------------------------------------------------------------------------
```

Figure 2: Ruler feature

Function key	Function key only	Shift + function key	Alt + function key	EasySpell: Ctrl + function key
F1	Acknowledge	Ruler		Spell check document
F2	Help	Cancel	Center	
F3	Character mode	Edit header/ footer	Cut	Spell check current word
F4	Word mode	Edit page parameters	Copy	
F5	Sentence mode	Paragraph mode	Paste	Mark words not recognized
F6	Line mode	Block mode	Clear	
F7	Page mode	Print current page	Tag	Find marked words
F8	Adjust	Stop printer	Merge	
F9	Previous	Search		
F10	Next	Go to page #____		

Table 1: Function key features

TALL TREE SYSTEMS

presents:

LOADABLE DEVICE DRIVERS FOR DOS 2.00

Successors to the widely acclaimed JFORMAT for Dos 1.10

JETDRIVE $40

The only Electronic disk to work on any memory board. Contents restored after Ctrl-Alt-Del. Plus our famous JET (high-speed file transfer) program.

WINDRIVE $40

Available for most Winchester hard disk drive systems. Source code permits adaptation and customization. The only way to have unlimited drive expansion and disk-sharing.

JFORMAT-2 $40

The only way to go beyond 360 K on one diskette. Allows for 24 different formats up to 2.5MB size.

Don't forget:

JRAM $800

The only memory board which allows more than 640K bytes per system. 512K bytes controlled by a hardware pager. Includes the jetdrive program.

TALL TREE SYSTEMS
1036 Los Altos Avenue
Los Altos, CA 94022
(415) 941-5500

Reader Service #187

Review

you've typed good material as well as bad, remember not to use the Cancel command.

Another complaint I have has to do with the modes. As noted, many *EasyWriter II* functions perform differently in different modes. Usually this is a convenient feature, but a problem arises if you press <Del> when you think you're in the word mode but are really in the line mode. Zap—there goes the whole line. I try to stay in word mode (I feel it is the most useful), but on more than one occasion I've zapped a line when I intended to zap a word. I know this is *EasyWriter II*'s way of telling me that I'm getting tired and should walk the dog, but it's still frustrating. *EasyWriter II* asks you to confirm a deletion when in page and paragraph mode, so you can't zap large blocks of text.

My last quibble has to do with the Previous and Next features in page mode. Pressing <F10> in page mode takes you to the next page. This method is fine if you remember to switch back to word mode once you're on the page you want. But if you don't remember, the next time you press <F10> to move to the next word, you'll find yourself moving to the next page. If you have pushed

DOS-based EasyWriter II

Information Unlimited Software (IUS) has introduced a major revision of *EasyWriter II* in which the program has been converted to a DOS-based system from ASP (Application Support Program), the company's private formatting system. The upgrade costs $25 and includes four disks and a completely rewritten and expanded manual. Send a check, your original program disks, and the pages from the original manual (keep the binder), and IUS will send you the upgrade.

The upgraded program and the original program are functionally identical; you can almost make the transition to the upgrade without having to learn anything new. But the revision provides a number of additional advantages: it uses all the DOS commands for file management, and you can use double-sided disks instead of the single-sided ones required with the previous version. Double-sided disks effectively double the number of pages you can place on each data disk. The larger disk capacity also makes it possible to have the System and Housekeeping programs or the System and spelling checker programs on the same disk. Larger capacities reduce the amount of disk switching necessary, making the program easier to use.

Finally, with the DOS version IUS introduced a Folder Name function. With this feature you name the folder you wish to work with, and a menu displays the documents in that folder. This feature is necessary when you are working with the larger number of documents possible on a hard disk.

If you have *EasyWriter II* documents created under the original ASP format, you can obtain a utility from IUS to translate ASP disks into DOS disks. Note, however, that you must transfer from a single-sided ASP disk to a DOS disk that has been formatted as a single-sided disk. You can then copy the file onto a double-sided disk if you want to.

<F10> several times to move ahead several words, you must wait while *EasyWriter II* pages along. Having the program ask you to confirm that you want the page mode when you use the Next and Previous commands would be helpful.

Hardware

EasyWriter II requires an IBM PC with two disk drives and at least 64K of RAM, although you're also given a faster version of the program that needs 96K. The program works well with hard disks and disk emulators and it can be configured to work with just about any printer (dot matrix or letter quality) available on the market. It supports proportional spacing and a larger number of type fonts than *EasyWriter.*

EasyWriter II is available on many personal computers besides the IBM, but each implementation is virtually identical to the PC's. If you know how to use *EasyWriter II* on the PC, you can, for example, use it immediately on the Texas Instruments Professional Computer.

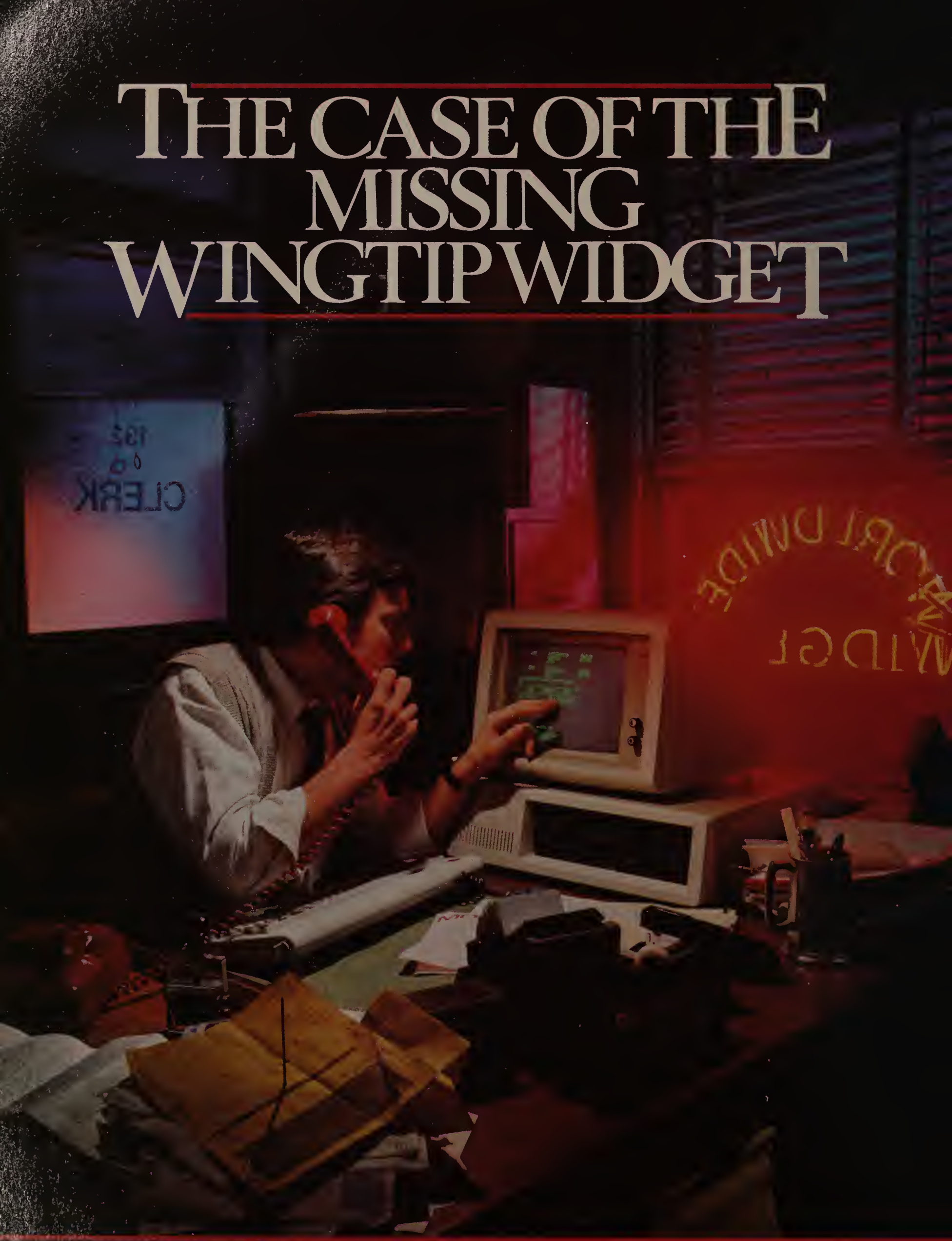
Information Unlimited has a phone support program. If you want this feature, you pay an additional yearly subscription fee. If you don't want it, take your problems to your dealer (who can then use the phone support program).

Communication is one of humankind's oldest and most pleasant activities. In some ways, word processing is just another development along the path of the better chisel, the more efficient quill pen, and the more dependable typewriter. My goal as a writer is to have as little as possible stand between my thoughts and the printed page. *EasyWriter II* has helped me come very close to my ideal.

EasyWriter II
Information Unlimited Software, Inc.
2401 Marinship Way
Sausalito, CA 94965
415/331-6700
List Price: $350
Requirements: 64K, two disk drives



THE CASE OF THE MISSING WINGTIP WIDGET



© 1983 by ABW Corporation

Solved...with the simple genius of the RL-1 Relational Database.

The night clerk's digital watch showed 2:35 a.m. when the red desk phone interrupted his inventory updates at the IBM PC. It was a double ring. An outside call. Williams sensed trouble as he punched line 3.

"Worldwide Widgets, Williams here."

"Walla Walla Widget Works," came the reply. "One of our widgets went."

"What type?"

"Wingtip."

Williams winced. Worldwide hadn't made a wingtip widget since way back when.

"We wouldn't have a wingtip widget at Worldwide, Sir. They're obsolete."

"If we don't get one by Wednesday," the voice wailed, "we're wiped out."

There was one chance. The RL-1 Database Management System. If he could track down the last time a Washington dealer had ordered a wingtip widget...

Williams was no programmer, but that didn't matter. Turning to the computer, he put the question to RL-1 in simple English:

```
Select DEALER, QUANTITY, DATE
from INVOICES
where PART EQ "WINGTIP WIDGET"
and STATE EQ "WASHINGTON"
```

Within seconds, Williams had his answer. A dozen wingtips went to Wally's Widgets 6 years ago. But would Wally have any left?

Yes! Waking Wally was well worth it. The last wingtip widget in Wally's warehouse was on its way to Walla Walla.

Who? What? Where? When? Why? RL-1 knows.

Give your micro the power of RL-1, and you'll be able to handle data like a master detective. Without mastering BASIC or COBOL or FORTRAN or any other mysterious language.

Once the RL-1 floppy disappears into your disk drive, you're armed with a complete relational database management system. And that means life at the computer is going to be a lot simpler from now on.

Independent minded.

The secret of RL-1's genius is *data independence*. Instead of locking data into programs, you create *independent* databases. So different programs can use the *same* data. And you can get at day-to-day information without expensive reprogramming. Or wading through reams of redundant data.

Case in point: standard programming packages. Like accounting, for instance, or inventory control. Most are fine for what they're programmed to do. Beyond that, even the simplest questions can leave them without a clue. Whether it's searching through invoices for missing widgets. Or looking for customers with too much debt. Or finding the address of your aunt in Vermont. Conventional programs just aren't smart enough.

Enter RL-1. So easy, the butler could do it.

It's a different case with RL-1. You'll DEFINE exactly how you want your information stored. Dollar signs that "float." Dates that look like "July 17, 1983," not "071783." Numbers that are decimal, integer, or real.

Then you'll input data easily with a full-screen editor. Or LOAD in batch directly from ASCII files.

Now use RL-1's Query Language. Ask your questions in English. Get your answers in seconds. Include high-level math—even statistics—in your line of questioning. (Programmers can tap RL-1's genius through its Program Interface.)

As your data changes, you can UPDATE and DELETE whole files with a single command. Or edit item by item with the Relational Editor.

A motive to get cracking.

The sooner you get started with RL-1, the sooner you'll be cracking your own tough cases. So here's a little "nudge." Order RL-1 from your dealer or ABW by June 30, 1983. And you'll receive a coupon good for a free Report Generator Application Pack. $75 worth of extra genius that'll make short work of your lengthiest reports.

RL-1. It takes the mystery out of managing your data. Available for your IBM PC DOS or CP/M system for $495, suggested list. Call or write, and we'll clue you in on all the facts. ABW Corporation, P.O. Box M 1047, Ann Arbor, MI 48106. (313) 971-9364.

RL-1
RELATIONAL DATABASE.
The simple genius.

ABW

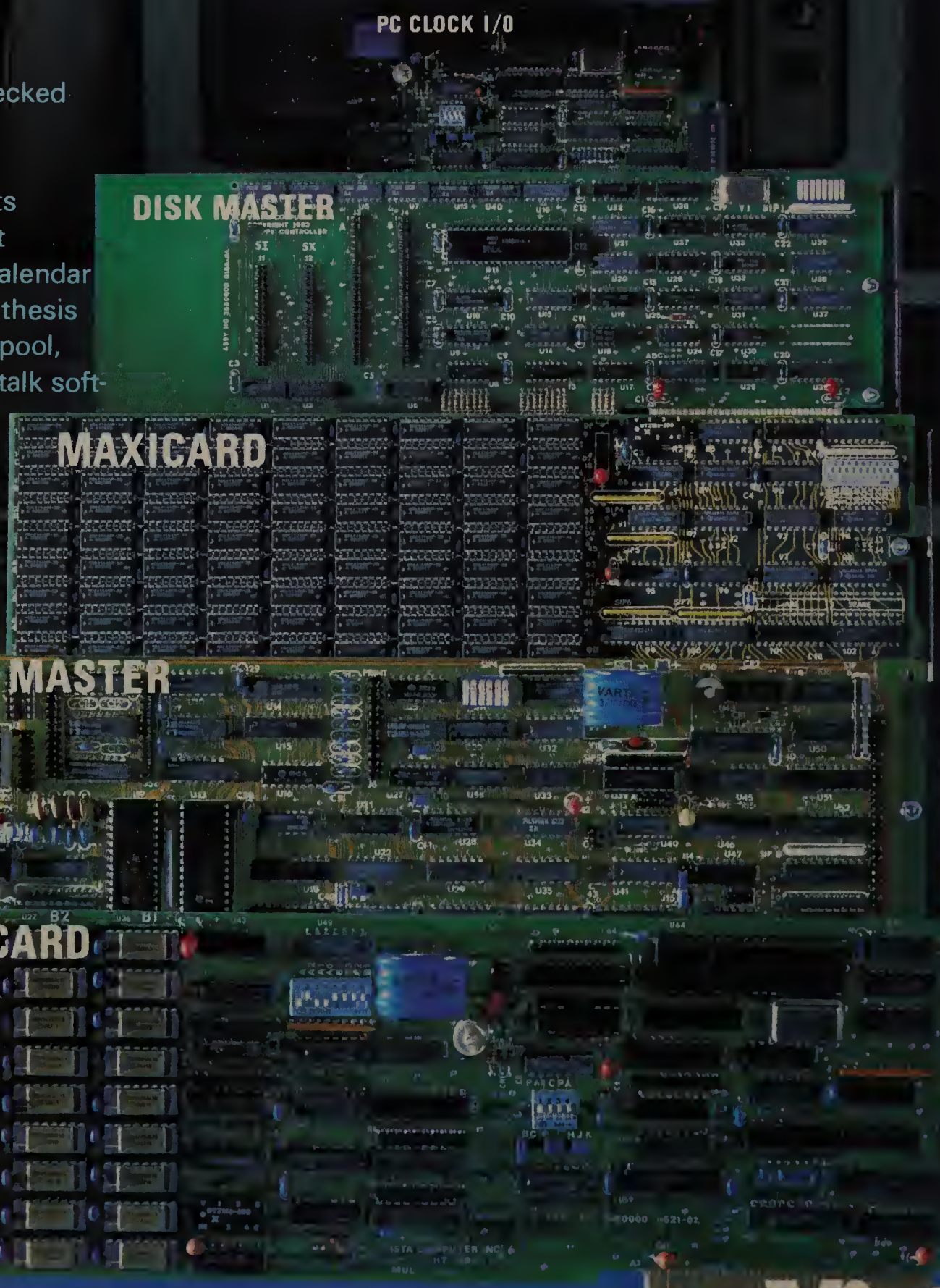
In Europe contact CACI Inc — International, 89 Sleet Road, Sleet, Hampshire. Phone 02514 22133. Telex 858718
IBM PC is a trademark of International Business Machines. CP/M is a trademark of Digital Research Inc

Reader Service #330

Expanding Your PC™ or XT™?
ASK for Vista

CHECK THESE FEATURES

- Multiple Floppy Disk Control - interface 5 1/4" and 8" media
- Hard Disk Control
- Joystick Ports
- 256K of Parity Checked Memory
- 576K of RAM
- RS-232 Serial Ports
- Parallel Printer Port
- Real Time Clock/Calendar
- Votrax Speech Synthesis
- DYNAdisk, DYNAspool, DYNAclock, DYNAtalk software



Vista expansion boards are fully supported by software to help you get all the benefits designed into the boards. Our DYNAdisk, DYNAspool, DYNAdos, DYNAclock, DYNAtalk, and Hard Disk interface software are supplied on 5-1/4" floppy diskettes. Appropriate diskettes are supplied with each board having the compatible feature. The software gives you the operational routines to achieve full serviceability from your expansion investment.

Your Vista Dealer has more details on our fine family of expansion boards and floppy disk drive systems. See him for a full listing of Vista's economical, high quality products.

For the Vista Dealer or Distributor nearest you - call our Vista Sales lines.

Reader Service #267

IBM, PC, XT are trademarks of International Business Machines Corp.

Datalife

Vista
COMPUTER COMPANY, INC

1317 East Edinger Avenue
Santa Ana, California 92705
(714) 953-0523 (800) 854-8017
Telex 910-595-1565

Lotus 1-2-3 with one button?

It's no secret. This is certainly "The Year of the Mouse."

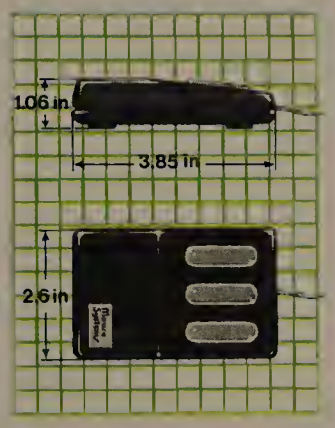
And the uproar is justified.

This "see and point" interface is the most natural, powerful and efficient way to interact with your computer.

And Mouse Systems' optical PC Mouse, now available with software support for the IBM PC, is easily the best of its breed; easily the best at making your computer user-friendly.

Grasp The Future of PC Technology

Slide our PC Mouse across its deskpad. It's optical. There are no moving parts. Your cursor instantly moves across your CRT in response.



Slim, compact size allows brisk moves in any direction.

No other device gives you such total, accurate control over cursor positioning.

The ergonomically designed PC Mouse is so smooth and natural in its movements, you'll soon be using it almost subconciously.

Your attention can thus remain on the screen and not on the keyboard, and your concentration will be increased dramatically.

PC Mouse lets you use this new freedom to take full advantage of today's "visual" software products.

(For a truly enlightening experience, ask your dealer to demo PC Mouse with IBM's Personal Editor.)

Use it with Existing Software

Named Mini/Micro's most significant new product of 1982, PC Mouse lets you bypass your keyboard for instant menu selection and function activation.

And PC Mouse requires no changes in your existing software. All cursor-related functions in 1-2-3, WordStar, VisiCalc, and other popular programs are replaced by the mouse.

By selecting items from "pop-up" menus, you eliminate the pondering and second-guessing of typing complicated command codes.

In Lotus 1-2-3, all commands are accessible from a single pop-up menu which we supply.

Simplicity, Itself

Just attach the PC Mouse to your PC's RS-232 port.

Each of the three buttons is user-programmable, allowing you to interact with your existing software without touching the keyboard. And PC Mouse comes configured for most popular software.


PC Mouse keeps your attention on your data, not on your keyboard.

Get It Now.

PC Mouse is immediately available for $295.00 including control software and all necessary hardware for your IBM PC.

For ambitious software developers, the optional $69.00 MouseWindow™ software package includes routines to do high resolution graphics and pop-up windows.

An OEM version of PC Mouse can also be supplied in quantity *now,* configured to your custom specifications.

For more details see your dealer, or contact Mouse Systems at 2336H Walsh Avenue, Santa Clara, CA 95051. Telephone (408) 988-0211 or telex 467848.



Mouse Systems

Making Computers User Friendly.

VisiCalc is a trademark of VisiCorp.
WordStar is a trademark of Micro-Pro, Intl.
1-2-3 is a trademark of Lotus Development Corp.
IBM and PC are registered trademarks of International Business Machines.

Reader Service #122

© 1983, Mouse Systems Corporation.

SUMO-TESTED

WOULD YOU BELIEVE 3 OUT OF 4 SUMO WRESTLERS RECOMMEND CASES BY COMPUTER-MATE?

Neither do we. But, it wouldn't surprise us. Because our cases are built with brute strength, able to take a tough beating from even the mightiest challengers.

Stop wrestling with your computer equipment. With our cases you have ease of transportation plus maximum protection for all your components. Standard cases available for IBM, DEC, Apple, TI, plus many others. Custom built cases are also available to help protect almost any configuration of sensitive equipment. For loss prevention, each case has a 3″ x 5″ personal identification frame and individual serial number with toll free number. And like all Computer-Mate products, each case is pre-screened for excellence and backed with a 100% unconditional guarantee.



Chances are your computer equipment will never undergo a heavy bout with a Sumo wrestler, but with protection from Cases by Computer-Mate™, the odds are 3 to 1 your equipment would win.

For order/information contact:

Computer-Mate. Inc.

1006 Hampshire Lane, Richardson, Texas 75080
Dallas (214) 669-9370 • Texas Residents (800) 442-4006
Out of State (800) 527-3643. Dealer inquiries welcome.
Reader Service #44

UNSURPASSED



BROTHER has done it again. Not content to ride on the phenomenal success of the HR-1, Brother now brings you the HR-25. A machine so improved and technically advanced, with a price/performance ratio that sets it apart in a class by itself.

Although the HR-25 has been designed to fulfill the demands of the high volume user, its price is affordable for even the smallest business groups. And the HR-25 will assure you the highest letter-quality printing at speeds of 23 cps, making it the fastest printer in its price range on the market today.

The BROTHER HR-25 is unsurpassed in every respect, and is backed by the DYNAX reputation for quality and service response.

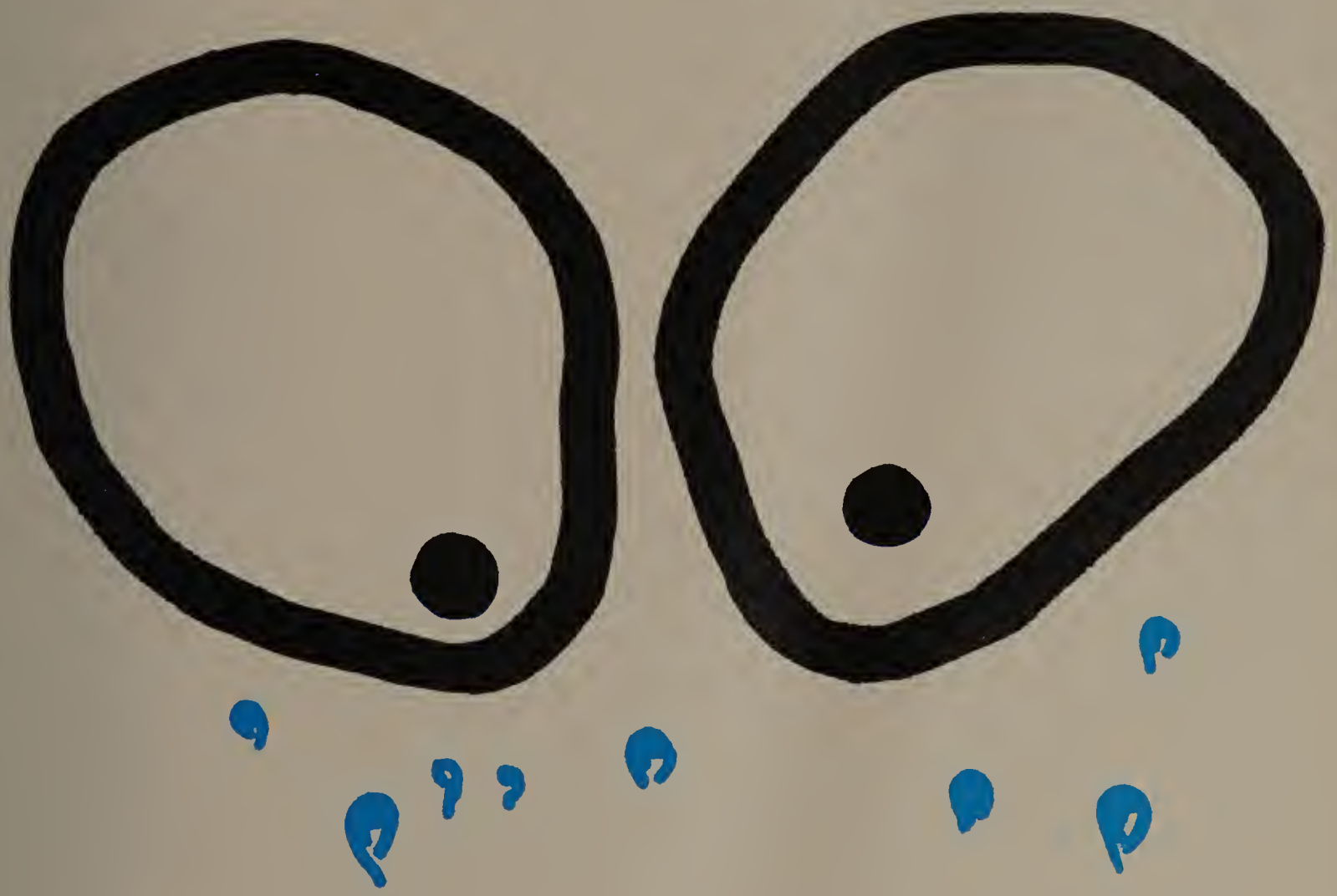
Options Available: Tractor Feed, Auto Cut Sheet Feeder

Dynax, Inc.

5698 Bandini Blvd., Bell, CA 90201
(213) 260-7121

brother. HR-25 ■ from the manufacturers of "OFFICIAL TYPEWRITER OF THE LOS ANGELES 1984 OLYMPIC GAMES"

Reader Service #368



HOW TO BREAK INTO WORDPROCESSING WITHOUT BREAKING INTO A COLD SWEAT.

Word is out. There's a new word-processing program that's easy to learn and to use and that takes advantage of one of your greatest assets: common sense. The name of this powerful program? EasyWriter II.™

EASY TO USE, OF COURSE.
Even though EasyWriter II is loaded with all the features you'd ever want, you'll still find it easy to get to know. With the friendly manual and a couple of serious hands-on sessions, you'll have the commands working for you, not vice versa.



...WITH FILE NAMES THAT ARE EASY TO IDENTIFY.
On EasyWriter II, you can use file names up to 30 characters long, instead of 8, like other leading systems. So your report on **Marketing Soft Lenses, 1983** can be called that instead of **MKSOLE.'83**. Think of the time you'll save when you can actually identify what you're looking for.

...AND A TEXT THAT'S EASY TO CHECK.
EasyWriter II shows you onscreen everything you're typing. Like underlines and BOLDFACE. You know what your text is going to look like when it's printed — before it's printed. Try that on other systems.

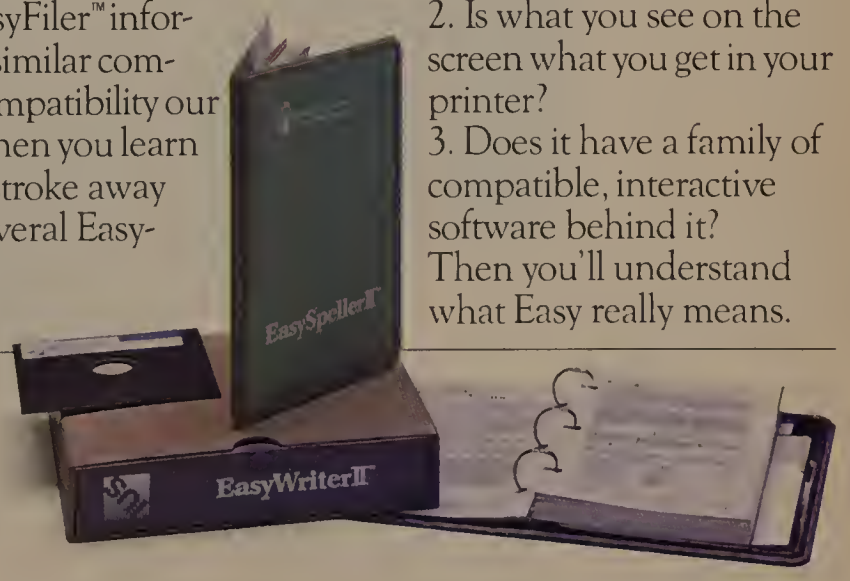
EASYWRITER II: RULER OF THE WORD.
EasyWriter II lets you create multiple rulers (margins) and save the commands in the document. So you can reformat in one quick pass, with variable margins and tab stops.

INTERACTION. MAKES OUR FAMILY EASY TO KNOW.
Once you learn EasyWriter II, you can produce an EasyPlanner™ spreadsheet or an EasyFiler™ information system using similar commands. We call this compatibility our interactive system. When you learn one, you're just a keystroke away from command of several EasyFamily™ programs.

NOW IT'S EASY TO WRITE WELL.
Put the 88,000 word EasySpeller II™ dictionary to work with EasyWriter II and you can automatically correct your spelling at the stroke of a key. With the Webster's medical or legal dictionary supplement, nothing can escape unnoticed. Or uncorrected.

...AND TO GET HELP.
EasyWriter II is supported by a toll-free subscription PhoneSupport.™ Genuine human beings answer your questions in clear, easy-to-understand terms.

...AND EASY TO BUY.
Ask for a demonstration of EasyWriter II at your nearest computer dealer. Compare EasyWriter II to any competitive wordprocessing system and be sure to ask these questions:
1. Does it underline and boldface on screen?
2. Is what you see on the screen what you get in your printer?
3. Does it have a family of compatible, interactive software behind it?
Then you'll understand what Easy really means.



EasyWriter II
EasySpeller II
EasyFiler
EasyPlanner

EasyWriter™
EasySpeller™

EasyBusiness Systems™
General Ledger and Financial Reporter
Accounts Receivable
Accounts Payable
Order Entry
Inventory Control Sales Analysis

EasyFamily
MAKE IT EASY ON YOURSELF.

Information Unlimited Software, Inc.
2401 Marinship Way, Sausalito, CA 94965, (415) 331-6700

Reader Service #228

THE ONE AND ONLY

CRAMBO

You've got a problem. Go to your favorite computer store. Ask to see their Combo Cards. Then ask about their RAM Cards. See the problem? Just too many to pick from. Now, ask to see the CRAMBO™. No problem. There's only one. Ours. Except you don't know what a CRAMBO is. You've probably guessed it's a Combo Card piggy backed to a RAM Card. So it only takes up one slot in your IBM/PC. That's right. But here are the details.

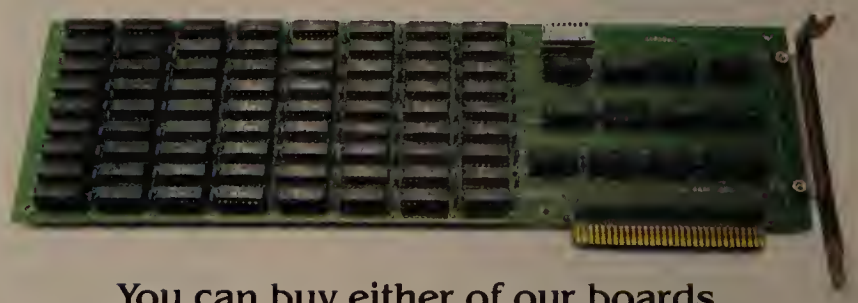


THE COMBO II CARD:

For **$189** you'll get a Clock Calendar, Async Communications, Parallel Printer and a Game Adapter.

THE 512K RAM CARD:

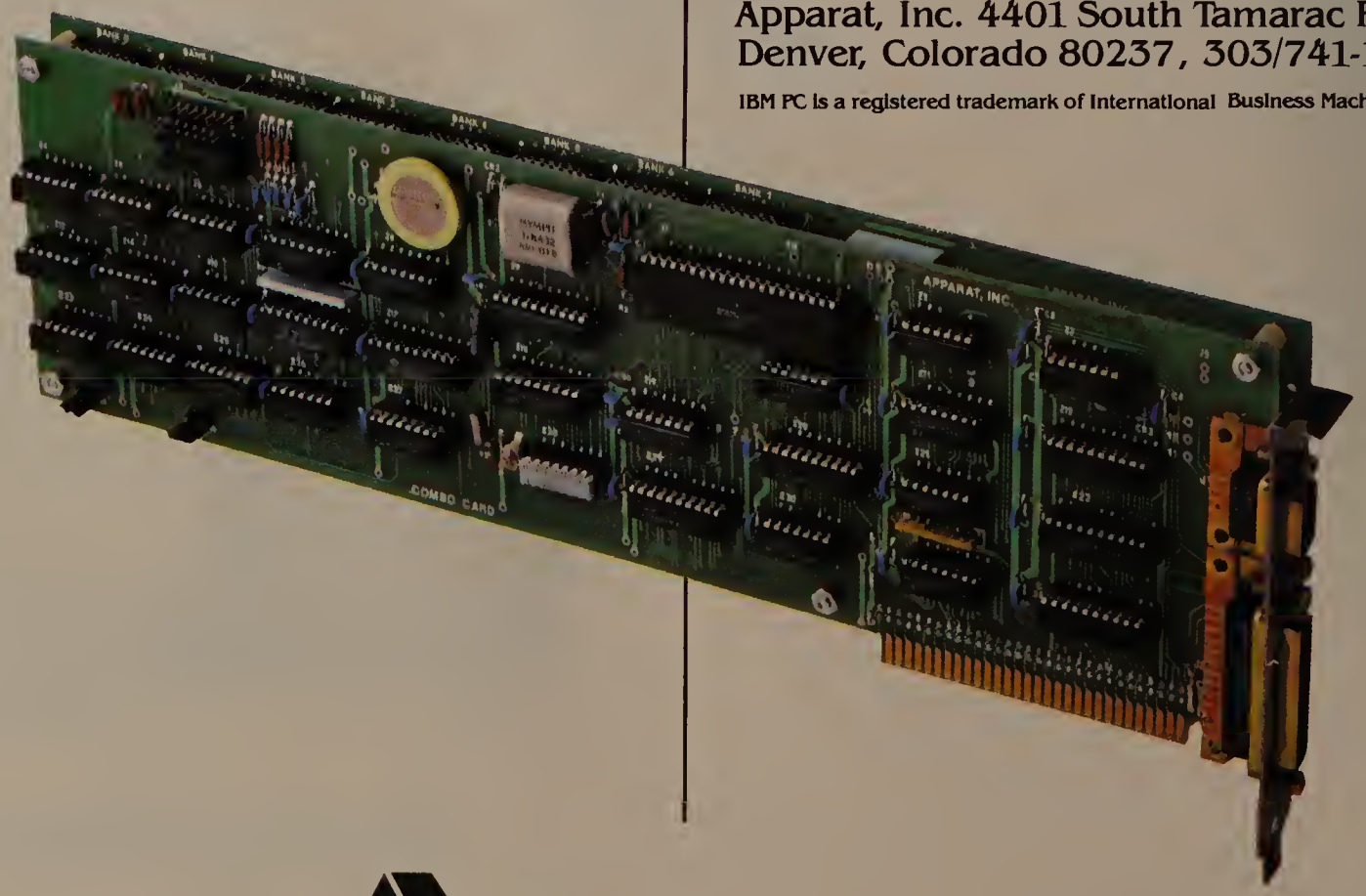
It too, is only **$189** with 64K of RAM installed. And when you need more RAM, 64K increments are available for $64 each. And, SDRIVE, the electronic disk emulator, is available at no cost with the RAM Card.



You can buy either of our boards separately for use in the XT or PC expansion chassis. But only our boards can be piggy backed to give you the one and only CRAMBO. And for only **$359.**

Go check out the CRAMBO at the same store carrying all those Combo Cards and RAM Cards. If they don't have the CRAMBO have them call us. **800/525-7674.** Or write: Apparat, Inc. 4401 South Tamarac Parkway, Denver, Colorado 80237, 303/741-1778.

IBM PC is a registered trademark of International Business Machine Corp.



Apparat, Inc.

Reader Service #10

The Ultimate Hard Disk System For The IBM Personal Computer



Thin-Film Plated Media Disk Drives With High Performance And Reliability That Leaves The Competition Behind...

Microcode Series 5000

Designed and engineered to deliver the highest level of performance and reliability available today using the latest Winchester disk drive and controller technology.

Series 5000 offers storage capacities of 10, 15, and 30 Megabytes with up to three times faster access times than other systems. Direct Memory Access (DMA) and Error Correction are standard features.

Designed to withstand shock that would damage other drives, it is the most durable disk drive on the market and carries a full two-year warranty.

Operating system software support includes DOS 2.0 or 1.1 and Concurrent CP/M-86. Self-documenting menu-driven software provides easy installation and selective file backup utilities. Local Area Network and shared file use is provided with PCnet* support.

Series 5000 prices are:

$2495 for 10MB
$2995 for 15MB
$3595 for 30MB

and is also available for COMPAQ** Portable Computers.

Ask your dealer to show you the Series 5000 or call us for dealership and quantity purchase information.

MICROCODE
CORPORATION

45277 Fremont Blvd., Suite 4
Fremont, CA 94538
(415) 657-4411

*PCnet is a Trademark of ORCHID TECHNOLOGY.
**COMPAQ is a Trademark of COMPAQ COMPUTER CORP.

Dedicated to Word Processing

The NBI co-processor expansion and software bring the time-tested features of a dedicated word processor to the PC.

Merrily Shinyeda



Hope is on the horizon for managers who want to combine the computational power inherent in the IBM PC with the capabilities of a dedicated word processor. NBI, the Boulder, Colorado, manufacturer of stand-alone word processing equipment, has adapted its popular word processing software to the IBM PC.

For users who have integrated needs, this release is significant for the following reasons:

- It is the first word processing software product for personal computers available from a dedicated word processing vendor.
- It is the first word processing package with a pedigree. It has been tested in thousands of high-volume word processing installations—it was not written or designed for casual personal computer users.
- The package makes good use of the PC keyboard, enhancing the program's ease of use and logical approach to text processing needs.

Getting Started

Along with the software and the training and reference manuals, the NBI Word Processing package includes a printed circuit board based on Motorola's 6800 processor. (Even though the NBI program is designed to run under the 6800 processor, documents created with NBI can be converted for use with PC-DOS.) The program works in conjunction with a

PC configured with a minimum of 64K and one disk drive. The board has 64K of random access memory that can be expanded to 192K.

Diagrams and step-by-step instructions covering installation accompany the NBI board. At first glance it looks as if any nontechnical person equipped with a screwdriver could insert the board in an available expansion slot and be off and running. The instructions call for reconfiguring easy-to-locate switches on the IBM motherboard and the NBI board to reflect the total amount of IBM and NBI memory in the system and then inserting the NBI board into any available expansion slot. Sounds easy enough, but if your PC already has added expansion cards, the fun is just beginning.

What the instructions don't tell you is that the positions of the memory expansion boards determine the proper switch configuration. If you have already installed boards between the IBM motherboard and NBI's board, you have to add the total amount of memory to the amount on the boards in place and then reset the switches accordingly. For a technician this situation would be immediately apparent and easily resolved. But this detail can cause novices a great deal of frustration (not to mention expense if the electronics are damaged) and a trip back to the place of purchase.

Menus and Prompts

When you start up the system, the program displays the main menu (see Figure 1). The list of operations to choose from includes Directory, Record, Edit, Print, Copy, Delete, Activate A drive, and Remove (or change) disks. (The NBI Remove or change disks operation is an important one. When you want to turn off the PC with disks inside the drives, you have to be sure to type the letter O for Remove disk. If you don't do this, you have to go through a long data recovery procedure the next time you want to use the disk.) While you cannot bypass the main menu, once you are familiar with the eight options, you can save time by entering your commands before the prompts appear on the screen.

The Directory option displays an alphabetized list of documents stored on the data disk. The list shows the date each document was last edited, its length in pages, and a document description (up to 38 characters long). The main menu options are listed below the directory, making it unnecessary for you to return to the main menu to select an operation. You can also select a document from the main menu without displaying the directory. These shortcuts save time, especially in the early stages of learning before you have memorized the letters assigned to each operation. The last line of the screen always displays messages such as the file/document name and the current page number and line position.

> NBI has trimmed the number of keystrokes to the bone.

Moving through Text

NBI has taken full advantage of IBM's well-designed keyboard by using the function keys extensively. This type of design minimizes the need to memorize the control-alphanumeric key combinations that make most other popular word processing packages difficult to learn and use. As a general rule, NBI has followed a logical approach in designating the operation of each function key. For example, frequently used operations such as indent, center, or menu require a single keystroke. Function keys used with the <Ctrl> key handle formatting for such things as tabs, page endings, headers, and footers. Function keys combined with the <Alt> key handle deletions, such as erasing lines or words or clearing tab settings.

In addition to making the most of the function keys, NBI puts the PC's cursor keys to good use. Using the right and left directional arrows with the <Ctrl> key moves the cursor through a line of text a word at a time. The <Home> and <End> keys instantly move the cursor to the left margin or to the last character of a line. Though the operation is slow, the <PgUp> key moves the cursor to the top of the previous page and <PgDn> positions the cursor at the top of the next page. <Ctrl>-<Home> moves the cursor to the top of the screen.

If you type long documents, you can send the cursor to a specific page by typing two commands and the number of the page you want to reach. When the desired page is located, the cursor goes to the first character on the first line of the page. This locate-page function is useful, but it has some peculiar limitations. Once the program has advanced to a specified page, it will not scroll backward above that page. In order to view a paragraph that is split between two pages, you have to search to the preceding page and advance the cursor manually down to the desired location. I found this awkward procedure irritating, both because it is unnecessary and because it isn't detailed in the manual.

Editing a Document

NBI has taken a unique approach to inserting and deleting text in documents. While I found the procedure somewhat awkward to use at first, I quickly adapted. The system automatically changes its typing default to strikeover or insert mode, depending on the location of the cursor. When the cursor is positioned under a character, you need only press a key to type over the character. But if the cursor is at a space, the system automatically goes into insert mode and continues in that mode until the cursor is repositioned. I was impressed with this feature because it makes

losing more than one word by typing over it impossible. If an incorrect key is typed, the <Backspace> key can be used to correct any mistakes immediately without canceling the insert function. If you want to insert characters within a word, you can use the <Ins> key.

NBI uses two primary methods for deleting information. The <Backspace> key erases characters to the left of the cursor, and the <Del> key erases characters to the right of the cursor. Words and lines can also be deleted by using function keys in conjunction with the <Ctrl> key. To prevent the accidental loss of special codes and preserve line/paragraph integrity, the <Del> and <Backspace> keys do not affect returns, format instructions, or special commands. These elements can be deleted only by using the special delete instruction, <Alt>-<F5>.

Formatting

Format is the way a page looks when it is printed—right and left margins, number of lines per page, spacing between lines, and pitch. Since most people produce a variety of document types, a good word processing package should include many formatting options that are easy to change.

NBI's standard format assumes you are using 8½- by 11-inch paper. Standard margins are 1 inch at the right, left, top, and bottom of the page; the standard pitch setting is 10; and the standard line spacing is single. If you like these format parameters, no format setup is necessary when you begin to type a page of text.

NBI lets you choose an unlimited number of line formats for line spacing, line length, and justification within a single document. The program allows only one format per document, however, for pitch, left margin, text length, top margin, and paper length. Formatting instructions for documents are stored as separate files attached to the main document.

```
WORD PROCESSING OPERATIONS
-------------------------------------------------

D  DIRECTORY DISPLAY
R  RECORD A NEW DOCUMENT
E  EDIT A DOCUMENT
P  PRINT A DOCUMENT
C  COPY A DOCUMENT
L  DELETE A DOCUMENT
A  ACTIVATE/DEACTIVATE A DRIVE
O  REMOVE OR CHANGE DISKETTE(S)

TYPE THE UNDERSCORED CHARACTER TO SELECT OPTION.
PRESS THE ESC KEY TO CANCEL ANY INSTRUCTION.
```

Figure 1: Main menu

The instructions are represented on the display as squares embedded in the text. Squares are also used in place of special printing instructions such as characters for underscoring, boldfacing, and overstriking. When the cursor is positioned under a square, the message line at the bottom of the screen tells you what instructions the square represents.

Though less obtrusive than multiple-character symbols, the instruction squares tend to clutter up the screen. For people who get confused by busy screens, the NBI screen can easily be converted to Proofreading Display mode, in which text appears as it will when printed. If you prefer the uncluttered screen, you can do all your editing in the proofreading mode.

People who use word processing infrequently as well as those of us who use it daily can appreciate the simplicity of NBI's reformatting process. Reformatting occurs automatically when you advance the cursor through the document after adding or deleting text or changing formats. The cursor moves freely across page boundaries, reformatting and repaginating as it goes.

Adjusting a paragraph by moving the cursor down through text is a fast and simple method. The fact that NBI is document oriented makes it possible to readjust an entire document simply and easily. In addition, repagination occurs simultaneously when you adjust text. If you want, you can also include a hyphenation pass, creating a more even right margin for multipage documents, and the widow/orphan line control may be used to prevent lines at the beginning or end of paragraphs from being separated from the rest of the paragraph.

Moving and Copying Blocks

For people who have trouble deciding whether a paragraph would work better on page 3 or page 12, the ability to move blocks of text within the same document is an absolute necessity. The NBI software handles this function well. You simply press <F3> at the beginning of the block to be moved and again at the end of the block. This action highlights the text to be moved. Next, position the cursor at the desired destination and press <F5>. Even better, you can mark the block, continue editing other text, and then insert the block when you are ready. Although NBI block moves are somewhat slow compared to the same procedure on a dedicated word processor, their simplicity makes up for their lack of speed.

I was satisfied with the NBI block move procedure, but I was somewhat annoyed to find no provision for making direct copies of information in a document. Rather than provid-

ing a direct copy key, NBI's method is to have you highlight the block of text (using the same procedure as that for moving text) and assign it a document name. When this is done, the program automatically erases the block from its original position and stores it as a document on the disk. To copy, the block must be reinserted into its original position as well as inserted at its new position. In addition to its requiring extra keystrokes, the real aggravation with this procedure comes when you are finished with the block. To avoid having these temporary documents permanently taking up space on your disk, you must go to the directory and delete them.

I must mention that although it is cumbersome for editing, the copy feature does have one redeeming aspect. The same operation can be used in a document/paragraph assembly application. Paragraphs stored as documents can be appended quickly into a document with a command made up of the paragraph's name and <F7>.

Tabs and Decimal Alignment

The NBI screen scrolls horizontally to accommodate up to a 13-inch writing line, enabling you to create and edit wide charts. Both regular and decimal tab stops can be set at any point on the format line anywhere in the document. The decimal tab instructs the system to align numbers at a decimal point and can also be used to align text at the right edge of columns.

Accountants and others who type lots of statistical data may not find NBI word processing to their liking. NBI does not offer any math calculations or the ability to automatically move columns horizontally or lines vertically on a page, although columns may be moved, inserted, or deleted manually. Using the move and copy features of the NBI, it is possible to move entire tables or make separate documents out of them to use as insertions in other documents.

Search and Replace

Once considered a feature limited to dedicated word processors, search and replace has become a mainstay on virtually all word processing packages. NBI is credited with introducing this feature to the word processing community on the dedicated system 3000, and they have incorporated the speedy and efficient approach into the PC version.

Text searching occurs in a forward direction only, and a search can be initiated for a string of up to 77 characters. Because the program is not case sensitive, it locates all occurrences of a word regardless of whether the word is upper- or lowercase, underscored, or hyphenated and broken at the end of a line. After locating the first match, finding subsequent occurrences of the desired string requires only a 2-keystroke command.

In addition to finding and replacing words throughout a document, you can tell the system to search for a word and then stop for verification before it replaces the word. Replacement text matches the upper- or lowercase characteristics of the original character string.

Headers and Footers

Headers and footers are terms for document titles and page numbers printed in a document's top and bottom margins. With NBI, headers and footers are recorded as subdocuments attached at the beginning of the main document. Headers and footers may contain any number of lines and include underscored and boldfaced text. You can position page numbers in either the header or the footer and instruct the program to begin numbering at any page in the document, which is a nice feature if you don't want page numbering to start on the first page.

I found two flaws in the NBI header and footer feature. The program doesn't produce footnotes, and it doesn't handle alternate left and right page numbering for book format.

Creating Outlines

If you are a teacher who writes course outlines, a writer outlining your next novel, or an architect who prepares architectural specifications, NBI's unique outlining feature by itself will make the program worth its price. The feature allows you to type an outline with up to six indentation levels. The program automatically indents the text for you according to the appropriate outline level you have reached and inserts the right numbers. If you remove or insert an item, the remaining items are automatically renumbered when you scroll through the text. The program offers three outline format options.

Document Merge

NBI's approach to document merging parallels the approach taken by most dedicated word processors. The merge function, while most commonly associated with form letter production, can be used whenever variable information must be inserted in a document. To use this function,

Text searching occurs in a forward direction only, and a search can be initiated for a string of up to 77 characters.

you create a main document with a "switch code" recorded at each position where you want to insert information. The switch code is inserted by pressing <Ctrl>-S and choosing an identifying name of up to 10 characters for the variable. The switch code is displayed on the screen as an instruction square. When you want to identify the variable (such as the name, address, or amount), you position the cursor under the square to display a message at the bottom of the screen.

Review

Variables are recorded as separate documents, with each variable followed by a variable mark, <Ctrl>-V, and each group of variables divided by a "group code," <Ctrl>-G. The main document and the variables are merged during the print operation, enabling you to continue to edit or record another document during printing. Merged documents are not stored on disk, so they don't take up valuable space.

Printing

In addition to the IBM 80 cps Matrix Printer, NBI supports the QUME Sprint 9/11, Diablo 630, and NEC Spinwriter 3500Q letter quality printers and the Epson MX-80 and MX-100, Okidata Microline 84, and NEC 8023 dot matrix printers. Like the merge feature, NBI printing is designed to let you edit and print at the same time.

You can print selected pages of a document in any order. When you stop the printer, printing ceases immediately; you can then choose to resume where you left off, or you can start with the current page or reprint the entire document.

NBI provides underlining, boldfacing, strikeover, super- and subscripting capabilities, and the ability to print documents with different type styles. Type styles are designated in a document as, for example, type style #1 and type style #2. The first printing pass prints the text in the first type style only, leaving blanks where a change in style is indicated. After the first pass, you reinsert the paper and the printer fills in the blanks with the second type style.

Documentation

NBI's training guide and reference manual are exceptionally well written. Intended for the novice to word processing, the documentation presents concepts and discusses applications for each feature. The training guide provides easy-to-follow exercises prerecorded on a training disk that comes with the book. If you have experience with word processing, you can skip the preliminaries in each training section and go straight to the exercises. Each new lesson and exercise reinforces what you have learned in previous lessons.

The NBI reference guide presents all features and functions of the system in alphabetical order and includes a description of each, with the keystrokes necessary to perform the operation. The Message section provides a quick reference list of screen messages, with explanations about what they mean and how to respond to them. The Troubleshooting section lists common problems and suggests possible solutions.

NBI provides four levels of help screens that can be accessed at any stage of producing a document except the header or footer stages. The first help level displays the function key operations. The second level displays unshifted function key operations. The third level displays the uses of the function keys when they are shifted with the <Ctrl> key, and the fourth level displays the uses of the function keys when they are shifted with the <Alt> key.

The professionalism of NBI's training guide and the helpfulness of the reference guide deserve high marks. I was impressed by the authors' ability to present difficult concepts in easy-to-understand terms. The quality of the documentation is a tribute to NBI's many years of experience in office environments.

No Disappointment

Known throughout the industry for the outstanding quality of its dedicated word processing systems, NBI has not disappointed anyone with this version for the PC. Although not as powerful as NBI dedicated systems, the PC version has more features than many currently available word processing programs and is easy to learn and use. From basic editing to sophisticated applications, NBI has trimmed the number of keystrokes to the bone. The system is highly reliable; through all the destructive maneuvers I attempted, NBI could not be brought down. The system is responsive. A professional typist capable of "bottlenecking" the system will not be able to out-type it—this program plays catch-up extremely well.

The functions available on the NBI have been designed with their intended applications in mind, unlike many programs that supply the solution and leave it to you to figure out the problem.

The question remains, is the program worth its $695 price? I believe that this program is better than the number-one-selling word processing software, priced at $500. In addition, the NBI circuit board that comes with the software provides you with an additional 64K of memory, allowing you to expand the memory of your PC. Certainly anyone who handles long documents or prepares mass mailings using mailing lists considers installing additional memory early in the game. The cost of an expansion board plus word processing software will come close to the price of the NBI Word Processing package. In this respect, it's either pay now or pay later.

Tapping into the market mania for the IBM PC, NBI has effectively signaled a new era in personal computer word processing. The first of a new generation of word processing packages, this program should up the ante, forcing competition to introduce more professional-quality word processing packages.

Merrily Shinyeda is the Director of The Sierra Group, a Tempe, Arizona, based office automation marketing research and consulting company.

NBI Word Processing
3450 Mitchell Ln.
P. O. Box 9001
Boulder, CO 80301
800/NBI-1111
List Price: $695
Requirements: 128K, one disk drive

The TTX-1014 Desktop Daisywheel.

Professional Printing. Personal Price.

$649 buys a letter-quality daisywheel printer for your IBM PC.

You don't need a big-business budget to make your IBM PC hard copy look like a million dollars. The TTX-1014 Desktop Daisywheel delivers true letter-quality, professional printing for just $649.

$649. Complete. The TTX-1014 comes complete with features that most printers offer only as expensive, extra-cost options. Like a pinfeed-forms guide. Plus built-in RS232C serial and Centronics-type parallel interfaces—both standard.

Performance. Not Problems. The compact TTX-1014 is built to handle all your letter-quality printing needs. Pin-feed forms? No problem. The TTX-1014 lets you use forms from 2 1/2 to 14 1/2 inches wide. Want a different typeface? No problem here, either. The 100-character ASCII printwheel can be changed in seconds... and extra daisywheels are available in computer stores and major retail outlets everywhere. And you can quickly select pitch (10, 12, or 15 characters/inch) and linespacing (4, 6, or 8 lines/inch) by program control or built-in switches. All that plus bidirectional printing at up to 14 cps. And all for $649.

Built Business Tough. In business, dependability counts. And the TTX-1014 is built to stand up to the rigors of business applications. At a typical 25% duty cycle, business users can look to a full 3000 hours of printing before servicing is required. And in home use and other light applications, the TTX-1014 can deliver many years of trouble-free operations.

Professional printing. Personal price. The TTX-1014 Desktop Daisywheel. Professional performance for just $649. It's what's right for your IBM PC. Try one at your dealer's today.



TTX™

Teletex Communication Corporation
3420 East Third Avenue
Foster City, California 94404
415/341-1300 TX:349420
Reader Service #326

$649 is manufacturer's suggested retail. IBM, and IBM PC are registered trademarks of International Business Machines Corporation.

HERE'S WHAT OUR NEW, 1200-BAUD, DO IT ALL, ONE STOP SHOPPING, DON'T BREAK THE BANK MODEM FOR YOUR IBM PC LOOKS LIKE:

Introducing the PC:IntelliModem™ from Bizcomp. With your IBM PC or XT, it looks like a big nothing.

That's because it's *inside*. Where any modem connecting your Personal Computer to the telephone network should be. And where you won't have to worry about all those little boxes, couplers, cables and power cords getting in your way. Or being knocked off your desk.

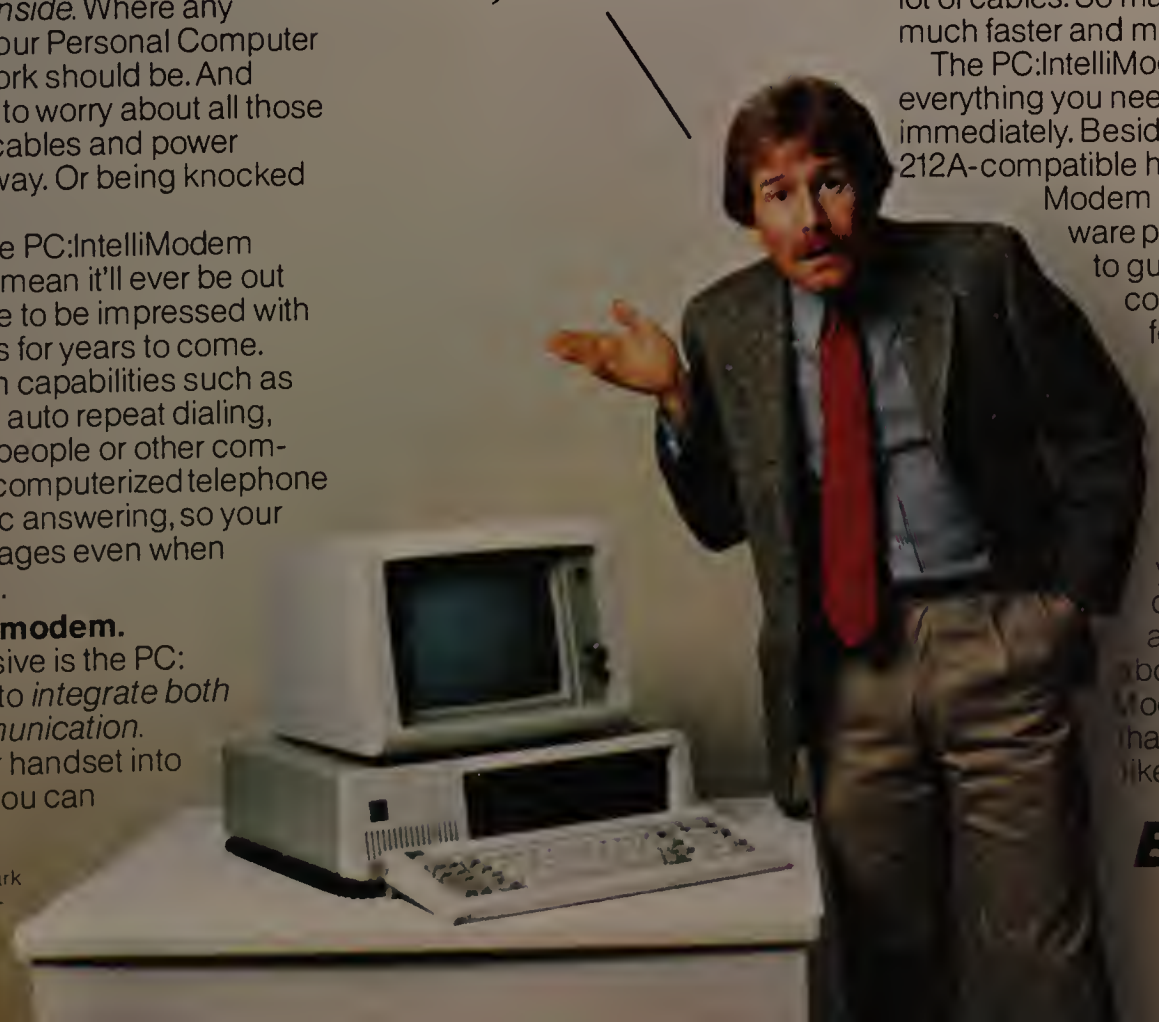
But just because the PC:IntelliModem is out of sight, doesn't mean it'll ever be out of mind. You'll continue to be impressed with its do-it-all capabilities for years to come. Advanced data comm capabilities such as automatic dialing and auto repeat dialing, for selectively calling people or other computers from your own computerized telephone directory. Or automatic answering, so your PC can receive messages even when you're not in the office.

More than just a modem.

Even more impressive is the PC:IntelliModem's ability to *integrate both voice and data communication.* By plugging a regular handset into the back of your PC, you can now switch between talking or listening and sending or receiving data–without having to hang up, re-dial or plug and unplug a lot of cables. So making connections is now much faster and more convenient.

The PC:IntelliModem comes complete with everything you need to start communicating immediately. Besides its sophisticated Bell 212A-compatible hardware, the PC:IntelliModem includes a "friendly" software package with screen menus to guide you during use, plus complete written instructions for reference. And all this one-stop-shopping convenience is included in our modest price: $499. Which shouldn't break anybody's bank.

So if you're ready to turn your PC into a fast-talking data communications tool, ask your local IBM dealer about the Bizcomp PC:IntelliModem. It's a whole lot more than a modem. Even if it looks like a great big nothing.



PC:IntelliModem is a trademark of Business Computer Corporation. IBM is a trademark of International Business Machines Corporation.

BIZCOMP®

532 Weddell Drive
Sunnyvale, CA 94086
408/745-1616

Reader Service #24

Managing Projects for ~~Fun~~ and Profit Using

optional *required*

Project Scheduler™



NOW MS DOS version available



As a manager, you know the key to a successful project is good planning. Whether you are involved with engineering, R & D, Manufacturing, Construction or even Computers, you can't afford to overlook critical costs and deadlines.

PROJECT SCHEDULER™ is a project management program designed to help management meet deadlines and beat cost targets through fast and easy project forecasting, scheduling, control and tracking of project status. The menu prompts permit easy data entry for modification or update to large, complex project plans. The highly interactive design and visual display reduces project planning time by providing sophisticated "what-if" analysis capabilities.

Features include:

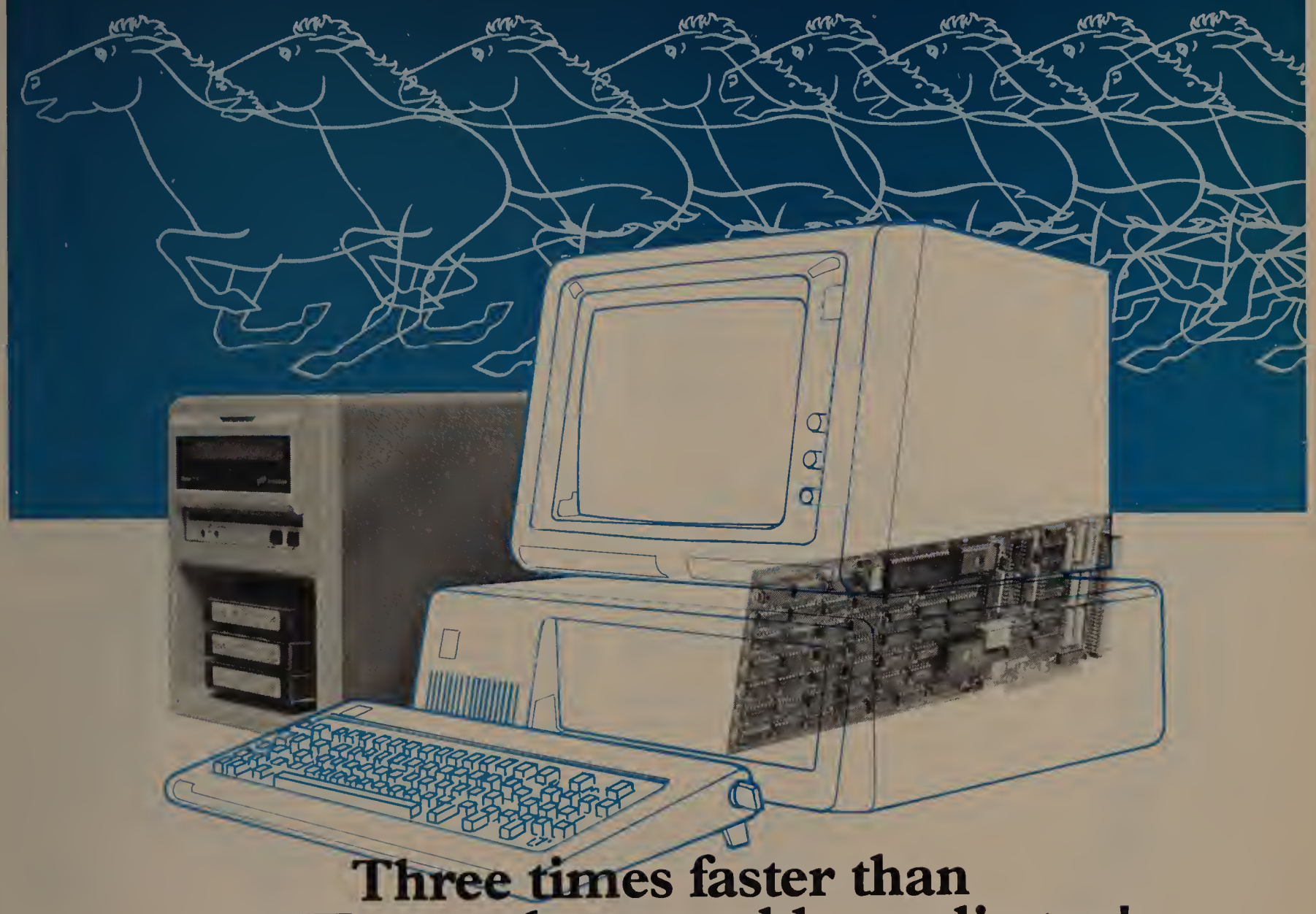
- Critical Path is calculated and a Gantt chart is displayed after each add, change or delete.
- Interactive "WHAT IF" analysis.
- Display your data/plots using the monochromatic or color screen.
- Schedule projects by days, weeks, months or day displayed by week.
- Labor & Other cost data can be input to VISICALC* and SuperCalc* spreadsheet packages.
- Allocate tasks by:
  - —Start & duration
  - —Early start
  - —Late start
- Create standard company Labor Grades, Other Direct Costs and Holidays:
  - —24 Labor Grades
  - —24 Other Direct Costs
  - —30 Holidays (multi-year)
- Create detailed & summary reports:
  - —Project Schedule
  - —Labor & Cost
    - by time period
    - by individual job
- Ability to "complete" jobs for performance tracking.
- Milestone annotation to identify special events in the project.
- Requires:
  - —IBM DOS (160k Memory)
  - —1 disk
  - —Monochromatic and/or Color display
  - —Printer (recommended)

SCITOR

SCITOR CORPORATION 710 Lakeway, Suite 290 • Sunnyvale, CA 94086 (408) 730-0400

*Visicalc is a trademark of VisiCorp *SuperCalc is a trademark of Sorcim

Break Away from the Pack with the Maverick SMD Rigid Disk Controller by Interphase.



Three times faster than an XT . . . and removable media too!

Interphase brings you the most powerful disk controller available for your IBM or IBM compatible personal computer. With the Maverick, your PC can use any of the dozens of high performance disk drives supporting the industry standard SMD interface. You can have capacities ranging from 16 to 1600 megabytes or more — enough for even the largest accounting or data base management applications. You can have fixed media or removable cartridges or a combination of the two — just the thing to handle your back-up and archival problems. Plus you get three to four times the performance of the current Winchesters.

To find out more about the Maverick disk controller or our turn-key disk subsystems contact Interphase today.

Ride with the thoroughbreds from Interphase.

INTERPHASE corporation

2925 Merrell Road, Dallas, Texas 75229 214/350-9000 Telex 73-2561 (TELESERV) DAL

Reader Service #402

MICROPRO® SOFTWA

Ask these questions now, or you

IF WE EXPAND OR CHANGE, WILL OUR SOFTWARE GROW WITH US?

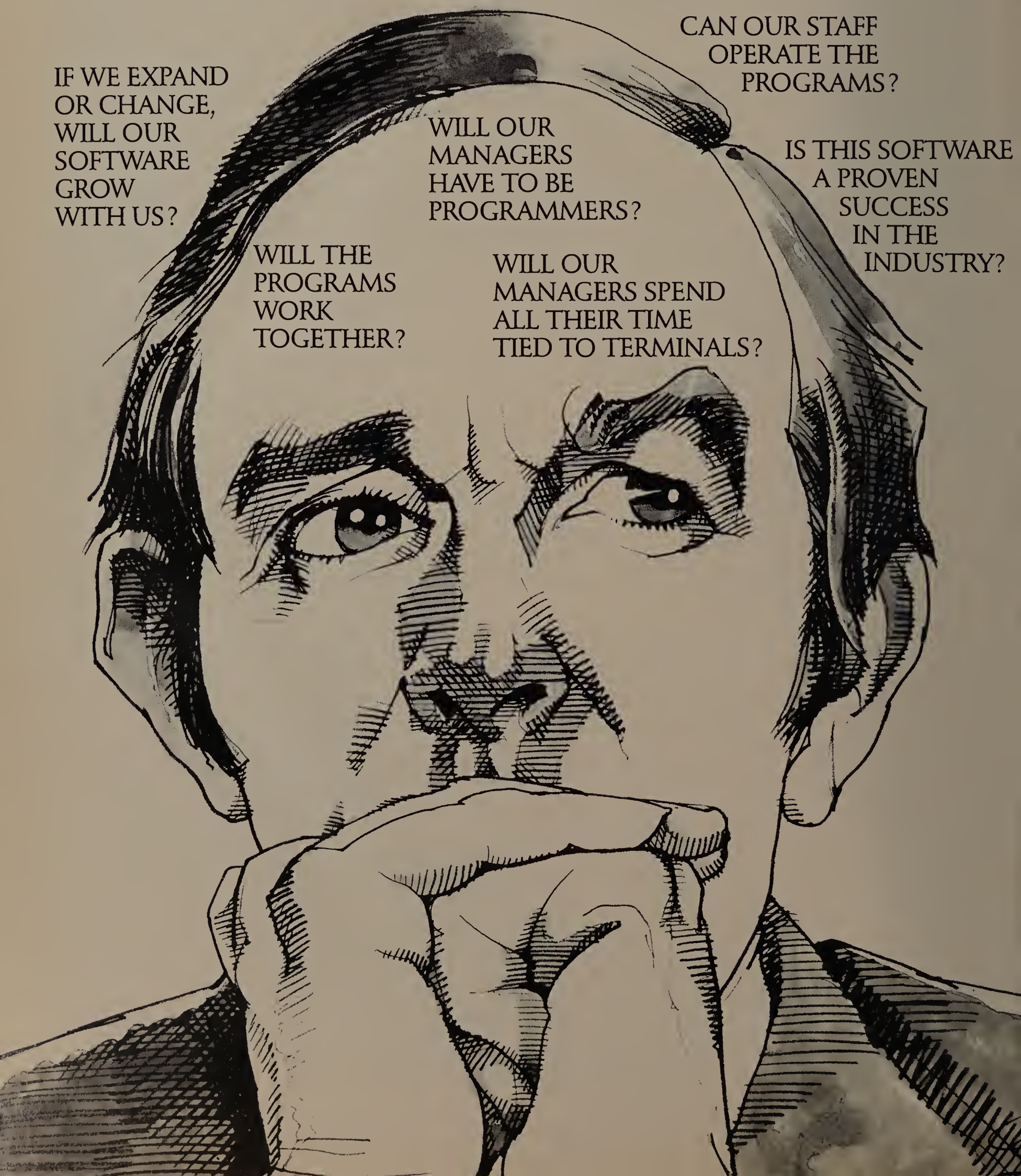
WILL THE PROGRAMS WORK TOGETHER?

WILL OUR MANAGERS HAVE TO BE PROGRAMMERS?

WILL OUR MANAGERS SPEND ALL THEIR TIME TIED TO TERMINALS?

CAN OUR STAFF OPERATE THE PROGRAMS?

IS THIS SOFTWARE A PROVEN SUCCESS IN THE INDUSTRY?



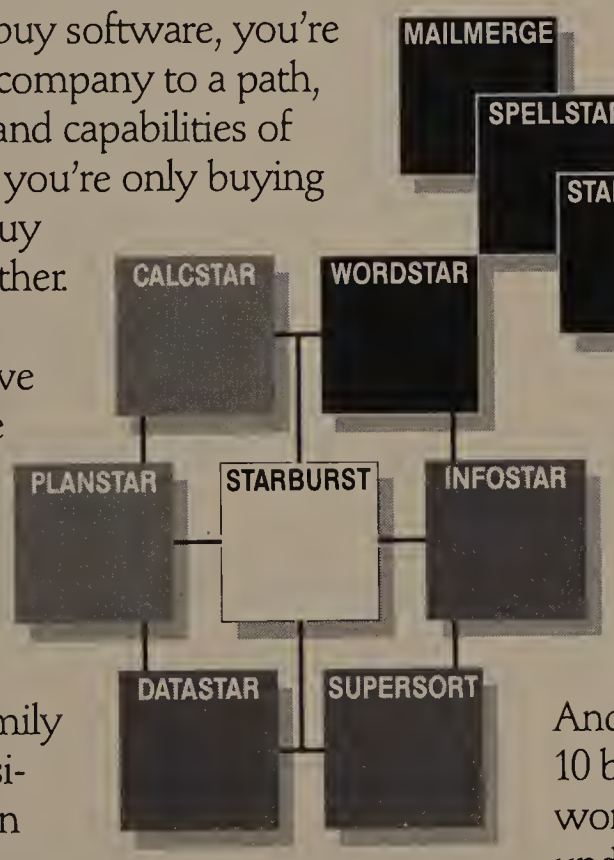
RE BUYER'S GUIDE

will have to answer them later.

MICROPRO HAS THE ANSWERS.

Whatever your current situation, there are factors in the software market that apply to you. Unfortunately, they tend to make choosing software a little intimidating.

For one thing, when you buy software, you're committing yourself and your company to a path, largely governed by the scope and capabilities of a software product *line*. Even if you're only buying *one* program now, when you buy more they should all work together. This makes your first decision rather far-reaching. It's expensive and time-consuming to change software; and sometimes requires buying new hardware as well.



MicroPro arms you for any eventuality with the most completely integrated family of business software in the business. Each of our wide selection of programs offers a range of capabilities from the simplest tasks (like memos) to the most complex office automation jobs. Their vast capabilities in Word Processing, "What If" Analysis, Financial Planning, Data Base Management, and more, can be instantly applied to any project; because all MicroPro programs work together. They share information, operating procedures, and perform complementary business applications.

Perhaps the most valuable option of all is the ability to build your own automated systems. With StarBurst®, a manager can set up simple step-by-step menus to guide staff through delegated tasks. Only MicroPro makes it simple enough to do yourself so you don't spend all your time doing mundane programming instead of creative managing. And only MicroPro makes it possible for you or another manager to change applications later—without a programmer, in plain English.

Obviously, in business, options are important. That's why we designed the most flexible and comprehensive software system for business. And it's put our programs among the top 10 best-sellers for years, with WordStar,® our word processing program, becoming the undisputed standard for the industry.

So don't waste any more time reading about how MicroPro's software answers can pave the way to a more successful future for you and your company. Go to your local computer store, and ask them to show you. For the dealer nearest you call (800) 443-0100 ext. 948.



MicroPro®

When you start with MicroPro, there's no stopping you.



For name of the dealer nearest you, phone (800) 443-0100 ext. 948.
For more information write MicroPro, 33 San Pablo Avenue, San Rafael, CA 94903. (415) 499-1200.

Reader Service #382

MoneyTrack is uniquely right...for some people

This new program makes it easy for you to do your own books. You can get all the obvious advantages of doing it yourself even if you know nothing about accounting—or bookkeeping.

Is MoneyTrack for you?

Only MoneyTrack is designed specifically for people with multiple sources of income, an interest in several ventures. For the doctor, lawyer, dentist, CPA. For the entrepreneur, owner of a small business, farmer, developer, general partner, agent, business manager.

Only with MoneyTrack can you keep complete, simultaneous records for activities like these:

- A small business *and* its related funds (like pension and profit-sharing funds) *and* all your personal finances (stocks and bonds, rental properties, trusteeships, etc.).
- A series of general partnerships, with separate records for each limited partner and for each profit center.
- A farm, treating each crop and each herd as a separate profit center.
- A retail store, treating each line as a separate profit center.

The "home accounting" programs aren't powerful enough to handle all this. The corporate general ledger programs are too cumbersome. Only MoneyTrack is the answer.

Powerful features for important matters

Here are just a few of the many features that make MoneyTrack unique:

▶Capacity. You can track up to 99 sources of money, up to 99 businesses or ventures. All share a 900-account general ledger.

▶Extensive logic. MoneyTrack simplifies complex transactions—like closing a real estate deal. For example, you can distribute a payment to as many as 18 accounts and MoneyTrack will make sure the transaction is balanced before you can file it.

▶Complete records. When your accountant suggests a change in income or expense classifications, you can modify any record because the complete detail is on file. And MoneyTrack will flag the change.

▶Pinpointed analysis. You can limit MoneyTrack's many detailed reports by dates, accounts, funds, businesses.

▶Check printing. You can specify up to nine print formats to match check formats you now use.

Above all, ease of use

Just a few of the reasons...

▶Operating system. No matter what operating system you're using, you can use MoneyTrack easily, simply—because MoneyTrack contains its own operating system. You insert the disk, press three keys, and start to work immediately.

▶One menu—and no intermediate files to slow you down.

▶Data entry. Big-system programming—over 11,000 lines of source code—makes data entry logical, consistent, simple; it anticipates your needs and problems, prevents errors.

Discover MoneyTrack's real value

MoneyTrack costs under $500—and will save you several times that each year just in CPA write-up charges. But to appreciate how much it can do for you—its real worth—you must see MoneyTrack in action.

Nothing easier. You can get a fee, no-strings demonstration at many computer and software stores.

Or just send us the coupon. We'll send you a teaching demo disk that shows exactly how MoneyTrack works, what it can do for you—and will give you a head start when you use the system.

The $30 cost applies *in full* to the purchase price. If you don't buy MoneyTrack, return the disk and we'll refund $20.

Call us with any questions—or for credit card orders. Pacific Data Systems, Inc., 6090 Sepulveda Blvd., Culver City, CA 90230, (213) 559-8713.

Pacific Data Systems, Inc. 02A10
6090 Sepulveda Blvd., Culver City, CA 90230

Send me the teaching demo disk under terms in the ad

☐ I have no computer ☐ I have _____
(specify make & model)

$30 Payment by ☐ check ☐ money order ☐ Visa™ ☐ MasterCard®

Card # _____ (expires) _____
(copy exactly as it appears on card)

Name _____

Address _____

City _____ State _____ Zip _____

Phone ( ) _____

Signature _____

Your name will not appear on any mailing list

=MONEY=TRACK=™

Runs on IBM PC • IBM Displaywriter
Most IBM PC compatibles
Digital Rainbow 100

PACIFIC Data Systems, Inc.

Reader Service #321

"Why Do I Love To Drive My 380Z™?"



"It's Got A
48K Buffer

Goes
0 to 200 W.P.M.

Is A
Daisy Wheel Printer

And
The Price Is Right"

- Compatible with your personal computer
- Most complete word processing & graphics
- Forms tractor & auto sheet feeder
- Now with more capabilities

"Test Drive One At
Your Computer Store"



DTC

Data Terminals & Communications, Campbell, CA
800-962-8185 • In CA 800-538-9294 • Dealer & Distributor Inquiries Welcome
Reader Service #387

For Game Gourmets

A trio of hunt and search games that are amazing in every way

Richard Cook

Two games reviewed in this issue are *Zork III*, the last in the famous *Zork* trilogy, and *Starcross*, a science fiction adventure game. Both are prose games that have the intellectual challenge and zany imagination you've come to expect from their manufacturer, Infocom. The third game, *Snipes*, is probably the most consistently entertaining and addictive computer game invented. All three games place you in the middle of long, dark corridors and twisting passageways where you can run but you can't hide....



Starcross star map

Zork III

Sequels always make me suspicious. These days anyone with an even marginally successful movie or novel follows up with numerous encores. Often the sequel is nothing more than a shallow rehash of the original work, but exceptions do exist: *The Godfather II* and *III* were actually better movies than the original; science fiction writer Frank Herbert's *Dune* sequels have all been fine books; and in computer games *Zork III* is just as exciting and puzzling as *Zork I* and *II*.

Zork III—The Dungeon Master is the final chapter in the tale of the Great Underground Empire. The land of Zork is littered with the bodies of all those who dared to risk *Zork*'s countless dangers and who paid the price with their lives, usually many times over, through reincarnation.

Maybe your corpse has been left at the base of a cliff or deep within the bowels of an endless maze as food for the trolls and dragons of *Zork I* and *II*. Or perhaps you've never ventured into the Great Underground Empire and wonder if you have the nerve to challenge *Zork III* when more experienced players have failed at *Zork I* and *II*. But never fear, you don't need previous knowledge of *Zork*'s dangers to do well at *Zork III*. It's no more difficult than the other *Zork* games.

The setting for each game is the same, but the themes are different.

Your goal in *Zork III* is, as the playing manual ominously puts it, "to discover the secret purpose of the Dungeon Master, who will oversee your ultimate triumph—or destruction—in the realm of Zork." If that doesn't curdle your cheese, nothing will.

Zork III seems to have borrowed from the movie *The Empire Strikes Back* for some of its characters. The Dungeon Master sounds like a cross between Obe Wan Kenobi and Yoda. There is also a fight scene with a hooded figure who looks very familiar. But then, where are Han Solo, Chewbacca, and Princess Leia?

All the familiar *Zork* elements are present: endless passageways leading to conflict, treasure, and adventure; baffling secrets, puzzles, and paradoxes; and the ever-present threat of death with the concomitant promise of reincarnation, which will cost you ten points, of course.

Playing the Game

Starting *Zork III* is as easy as inserting the disk and pressing ENTER. Instantly you find yourself in a strange place filled with mysterious shapes and shadowy danger—no, it's not the men's room at the bus depot. *Zork III* starts you off at the bottom of an endless staircase; from there it's business as usual as you crawl, climb, fight, and blunder with abandon. (Hmm...maybe it is the men's room at the bus depot.)

You can move in any of the eight compass directions plus up, down, in, and out, unless you are prevented from doing so by a wall, an ogre, or other obstacles. You must fight your way through the Great Underground Empire using tools and weapons found along the way to conquer obstacles, fearsome enemies, and endless confusion. Eventually, you will piece together the puzzle that is *Zork III*—if you succeed in your quest.

Evaluation

Zork III, like its brothers, is entertaining, but it can also be frustrating. Many of the puzzles you must figure out are not solvable except through trial and error or blind luck. In addition, *Zork III* often tells you it doesn't know or can't understand something, or it says you are standing next to an object that it then claims isn't there. At these times you realize that *Zork III* has its limitations.

Card or board games have their own limitations—they can't talk to you or compete against you. Although you can interact with a prose game like *Zork III*, its conversational skill is limited to that of a well-trained parrot. Someday we may see a prose adventure game from Infocom that can converse intelligently, but *Zork III* isn't it.

Instantly you find yourself in a strange place filled with mysterious shapes and shadowy danger.

Like all Infocom games, *Zork III* has been thoroughly tested; it's a polished, smooth-running program that has some sort of reply for anything you say. In fact, part of the game's attraction is its humorous responses to your often-desperate instructions. After giving the command `Get sword` you're told, "Who do you think you are, Arthur?" `Eat sword` draws the response, "I don't think that the sword would agree with you."

Besides supplying a light touch, *Zork III*'s responses often give valuable hints about the answer to a particular enigma. A wild guess may turn out to be the correct answer, or it may kill you. Either way, it's great entertainment.

Documentation and Warranty

Don't ever try to play an Infocom game without reading the manual. If you do you will get snagged by some minor problem you could have easily avoided by reading the instructions. You'll probably get snagged anyway by something else, so why double your trouble?

Luckily, Infocom's documentation is complete, easy to understand, and includes handy tips for playing the game without giving away too many secrets. The disk—not the program—has a warranty for 90 days.

The Final Reward

Although all the *Zork* games take place in the land of Zork, each has a special personality. *Zork III* feels like the end of the series. It has a mystical, walking-through-limbo-on-the-road-to-eternity feeling, as if the prize were not 20 treasures but nirvana. Nothing is what it seems.

Zork III is a fine sequel, but you may not want to buy it if you already own *Zork I* or *II*. Many other prose games are available, and you might prefer something different. If you don't have a *Zork* game already, any one of the three would be a good introduction to the series.

Starcross

Another name for *Starcross* might be Zork Goes to the Stars. In *Zork III* you run amok in an ancient empire deep underground, but in *Starcross* you run amok in an alien spacecraft in outer space. Like Infocom's other games, *Starcross* dares you to match wits with the computer on a voyage into the unknown, where befuddlement and death lurk every step of the way.

All the ingredients of a good Robert A. Heinlein sci-fi novel are here: the wildcat prospector (that's you), the sassy ship computer, and a lucky find that could be too hot to handle.

Playing the Game

The year is 2186 and you are somewhere in the asteroid belt between Mars and Jupiter searching for a black hole, any black hole. You want to haul it back to civilization where it can supply humankind with an inexhaustible source of energy, and you with a rich retirement. Don't ask me how anything with the massive gravitational field of a black hole could float about in our solar system without disrupting the orbits of all the planets, or how any spaceship could tow it around like a broken-down Chevy.

What's important is that instead of finding a black hole, you stumble onto a gigantic spaceship from another galaxy. How do you know it's from another galaxy? Because it doesn't say made in Japan, that's how.

Once you land on the alien spaceship, you have to find a way inside and then begin to explore in earnest.



Snipes screen graphics

> *Starcross* has all the ingredients of a good Robert A. Heinlein sci-fi novel.

You can move in several directions: port or starboard, fore or aft, up or down, in or out. You move freely about the vessel until you encounter an obstacle.

When this happens the first thing to ask yourself is, "Should I attack this thing?" If you don't immediately feel danger, try to take it along. If that is impossible, figure out what it is and does, and then try to find a way to use it or get it to do something. Or leave it alone; I don't care.

Unlike Infocom's other games, *Starcross* lacks a clearly defined object; if the game has one, the documentation doesn't explain it. All you know is that your mission is to explore the alien ship. If a larger purpose exists, it may become clear only after you have spent a few hours stumbling and bumbling about the ship.

Although your ultimate goal is a mystery, your immediate concerns are thwarting dangers and solving puzzles, which get you points up to a maximum of 400. One such puzzle presents itself when you find yourself in a large forest (that's right, in the middle of the spaceship) at the base of a huge tree. You climb the tree and discover a hatch to a dome that lies just beyond your reach. You want to climb inside that dome, but how will you do it? Solving each puzzle is an essential part of solving the larger mystery of the alien ship.

Evaluation

The single most important thing to know about playing *Starcross* is how to save a game position. Saving a game means you can pull out the disk, switch off your PC, and go to bed. This becomes important when you realize that *Starcross* can take several days or even weeks to play.

Not only that, *Starcross* is impossible to play without making at least one fatal error. Dying is inconvenient—you lose points, your belongings are scattered, often irretrievably, and you have to retrace every step from the bunk in your cabin on the Starcross. If you die more than three times, you stay dead. Sorry, but that's life.

Fortunately, you can learn to anticipate the times during a game when you are about to enter a dangerous situation and then save the game up to that point. Even if you croak you can smugly restore your prefatal position and continue the game, wiser and no worse for wear. (Sorry, but that's not life.)

The opening part of the game that leads to your landing on the alien spaceship plays the way a science fiction adventure novel reads. The action is fast and exciting and hints at strange and terrifying nightmares to come. Once you are aboard the alien vessel, things slow down as you are called upon to solve various problems while you explore every corner of the huge ship.

Infocom has chosen to design *Starcross* and *Zork III* in such a way that no one path works through all the obstacles. Infocom could have made the games more linear, as in the

opening sequence of *Starcross* when you must solve all the problems in one area before you can graduate to the next. In the games as designed, if you are stuck on one problem you can go somewhere else to tackle another one.

In *Starcross*, as you explore the alien ship you discover an overwhelming number of traps, puzzles, and paradoxes. My advice is to play the game using an organized approach, exploring one area at a time. Using the SCRIPT command to make a printout of the game as you play will prevent you from walking in circles.

Starcross is a tough, time-consuming game, so be sure you like a brow-beating challenge before you buy it. It is a great game in which to lose yourself for a few hours. The problems may be tough, but deducing—or lucking onto—the answers offers a sense of accomplishment.

Documentation

Starcross is imaginatively packaged in a thin, white plastic shell molded into the shape of a flying saucer. At first glance it looks like a large frisbee, but one toss across the room reveals that it doesn't fly like one. Flip it over, and inside the saucer you find the disk, instruction manual, star map, and other documentation.

Although it bears more than a passing resemblance to *Zork III*, *Starcross* has much to offer of its own, particularly if you are an avid science fiction fan. It is a well-made, engrossing game that might give you a new perspective the next time you gaze at the evening sky.

Snipes

For those who like the fast, cheap thrills that only a good zap 'n dodge game can deliver, *Snipes* is highly recommended. *Snipes* combines a *Pac-Man*-like maze with the hunt and search intensity of *Zork III* and the shooting action of *Berserk*.

Puzzled by BASIC's missing pieces?
Relax...

Now there's *MetaBASIC*, a powerful language preprocessor for IBM PC BASIC.

Anyone who has tried to develop large programs in BASIC will appreciate what MetaBASIC has to offer:

- **TRUE SUBROUTINES** You can break a large program up into small, manageable pieces. MetaBASIC links the modules together doing all the statement renumbering and variable renaming automatically.
- **TRUE ARGUMENT LISTS FOR SUBROUTINES** MetaBASIC subroutines are real subroutines which accept lists of passed arguments.
- **SOURCE CODE COMPRESSION** No more writing "scrunched up" BASIC for interpreter speed. MetaBASIC will do the "scrunching" for you. Your BASIC programs can be written with wide spacing, logical indentations, and plenty of comments.
- **NAMED GLOBAL COMMON AREAS** Any number of distinct global data areas may be set up for sharing between subroutines.
- **AUTOMATIC INITIALIZATION OF ARRAYS** Arrays are initialized automatically in FORTRAN-like DATA statements without loops through READ statements.
- **RECORD DATA STRUCTURES** Mixed data types may be grouped in one "logical record" as in PASCAL.
- **FULL COMPILER COMPATIBILITY** All MetaBASIC features work with the IBM BASIC Compiler for even higher-powered software development.

At its introductory price of $59 MetaBASIC represents honest value in software. Phone or write to order.

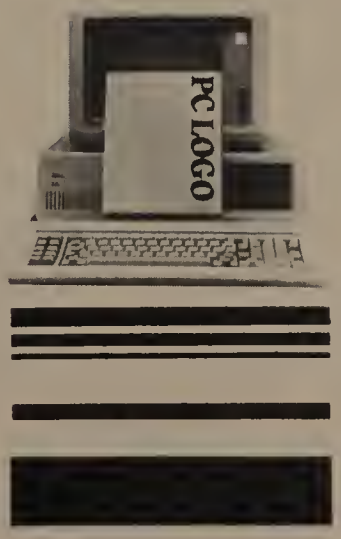
MetaBASIC (for the IBM PC with 64K & disk drive) **$59**
Add $3 for shipping. Mass. residents add 5% sales tax.

SOFTWARE 128
363 Walden St. Concord, MA 01742 (617) 369-6400

PC LOGO IS HERE!

The Logo language for the IBM-PC® is here. **PC LOGO** is a full implementation of Logo including word and list capability as well as turtle graphics. Since **PC LOGO** incorporates much of the syntax of Logos available on other computers, it is easy to learn. Yet **PC LOGO** goes far beyond other versions of Logo by taking advantage of the extra features of the IBM PC including function and arrow keys and provides a greatly enhanced editor.

IBM-PC is a registered trademark of IBM Corp.



PC LOGO features include:
- Program and Utility Disks
- Runs with IBM DOS
- Complete Tutorial and Reference Manuals
- Full peripheral communication capability
- 64K expandable to 128K
- Function keys defined

$199.95 complete

To order **PC LOGO**, contact:

Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143
(617) 492-2999

(Dealer Inquiries Welcome)

Reader Service #323

Review

Playing the Game

Snipes are bloodthirsty little spheroids whose raison d'etre is to hunt you down and either shoot you or blow you to pieces. They can't move very fast, but they are numerous, persistent, and effective.

The chase takes place in an exitless maze about one-fifth of which you can see on your screen at any one time. Your player is a pair of eyes equipped with flashing eyebrows over what appears to be either a bushy mustache or a mouth gaping in astonishment at all the snipes. Unlike *PacMan,* in which the maze is fixed and the player moves through it, in *Snipes* the player is fixed in the center of the screen and the maze moves.

The snipes merge one at a time into the maze through portals scattered throughout. They can reappear through the portals almost as fast as you can blast them, so the only way you can win is to find and destroy all the portals and then destroy all the snipes.

Meanwhile, the snipes are hunting you. They get your coordinates from the maze itself and shoot spears at you whenever you get within range, even if walls, other snipes, or portals are in the way. Their mindless attacks can work to your advantage: if you maneuver to a position close to a group of snipes but stay safe behind a wall, they will zap each other while shooting at you. Be alert when snipes shoot at you diagonally; their spears travel fastest that way.

Your weapons are speed, maneuverability, and your gun, which can fire a continuous salvo. Pressing the Space bar makes your player move at double speed—fast enough to outrun the snipes' spears. By comparison, the snipes are slow moving, but they make up in numbers and suicidal determination what they lack in quickness.

You move your player by using the numeric keypad: four keys move you right, left, up, or down. Your player can also move diagonally if you press any two adjacent keys. For example, pressing 8 and 4 moves you up and to the left. You can shoot in four directions as well as diagonally by using any of five selected letter keys.

Twenty-six play levels are available, from A to Z, each with increasingly hazardous features. For instance, level A provides an easy game with snipes that shoot infrequently, no exploding snipes (a nastier version of the shooting snipes), no bouncing bullets, and walls that aren't electrified. And of course, as you progress toward level Z everything gets tougher.

Snipes combines a *PacMan*-like maze with the hunt and search intensity of *Zork III* and the shooting action of *Berserk.*

The bouncing bullets are an outstanding feature. On the more advanced play levels, all bullets fired diagonally can ricochet up to eight times. This feature provides an enjoyable, imaginative way to destroy snipes that are lurking around corners or in passageways you need to go through without exposing yourself to danger. But be careful; the bullets can ricochet back and take you out too.

In addition to 26 play levels, you can choose from 9 skill levels to determine the maximum number of access portals and snipes you must face and the number of players with which to face them. At level 1 you face ten snipes and three portals with five players. At level 9 you face 150 snipes and ten portals with only two players. Staying alive for more than one minute, let alone winning, is almost impossible at level 9.

Evaluation

Snipes can be played on either a color or a monochrome monitor, but it is more attractive and easier on the eyes in color. The maze is blue, the snipes are green and brown, and the portals shimmer in alternating shades of red, gold, purple, yellow, and white. They are so pretty that you almost hate to destroy them.

The sound effects are nearly as entertaining as the graphics. Separate beeps, toots, and chirps indicate the sounds of bullets and spears being fired and snipes and portals being destroyed. Function key <F2> toggles the sound of your blaster only, while <F1> toggles all sounds.

A scorebox at the top of the screen keeps a running total of the number of portals, shooting snipes, and exploding snipes you have blasted as well as the total of each remaining. It also indicates the level at which you are playing, the elapsed time, the number of players you have left, and the score. Five hundred points are awarded for each portal you destroy and ten points for each snipe, although that isn't mentioned in the manual.

SuperSet Software has done an excellent job of testing and refining *Snipes.* The action is very fast and the screen instantaneously reflects keyboard input. The arrangement of the controls is logical and easy to use; in fact, this is one game that you could not play with a joystick because you need almost all your fingers to punch commands.

SuperSet designed *Snipes* so that it randomly creates a new maze and places the portals for each new game.

This thoughtful touch ensures that you won't face the boredom of picking your way through the same maze game after game.

Throughout many hours of serious testing *Snipes* never missed a command or cost me any points from programming errors, except in one case: the score does not always increment 500 points each time you shoot a portal. Big deal—you play *Snipes* more to win than to accumulate points.

Documentation and Warranty

The care that went into *Snipes* is apparent from the moment you pick up the attractive, durable, burgundy vinyl folder that holds the disk and playing manual. Inside, the 12-page manual offers strong evidence that at least some software manufacturers are hiring writers who can write simple declarative sentences. The instructions are not only easy to follow but were written with a sense of humor and are actually fun to read.

The warranty is virtually identical to Infocom's warranties for the *Zork* games and *Starcross*. The disk but not the program is guaranteed defect free for 90 days.

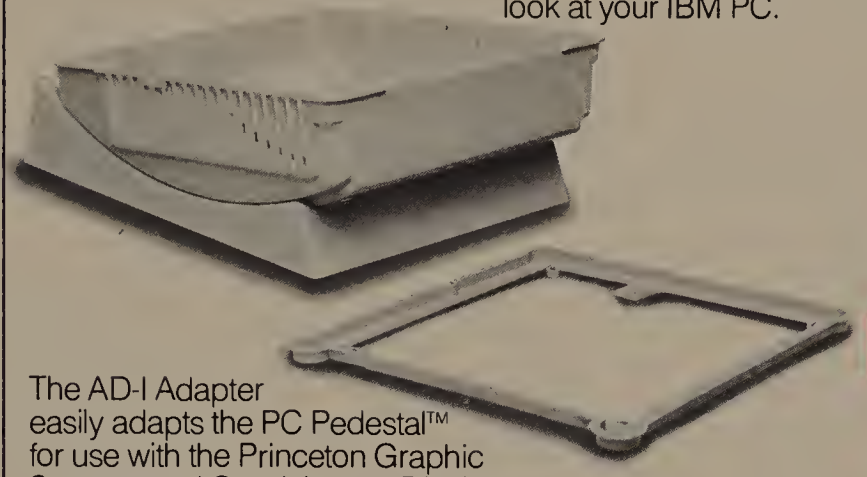
Snipes has everything you could want in a zap 'n dodge video game: it is original, well designed, and—best of all—the most enjoyable new game I've played on the IBM PC.

Zork III and Starcross
Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
617/492-1031
List Price: $39.95 each
Requirements: 64K, one disk drive

Snipes
SuperSet Software Corporation
P.O. Box 1036
Orem, UT 84057
List Price: $39.95
Requirements: 64K, one disk drive

Invest in comfort, the dividends feel good.

The PC Pedestal™ by Curtis virtually eliminates backache, eyestrain and fatigue. With the tilt and swivel PC Pedestal™ you can improve sight angle and minimize glare. And that results in greater comfort and increased productivity all around. For just a small investment, you can get a real good look at your IBM PC.



The AD-I Adapter easily adapts the PC Pedestal™ for use with the Princeton Graphic Systems and Quadchrome Displays.

Re-arrange your IBM PC ... comfortably

Developed exclusively for the IBM PC, all Curtis products have a lifetime warranty and are a perfect PC match in color, style and finish.

PC Pedestal™ II, Tilt and Swivel Base . 79.95 (for IBM PC Monochrome and Color Displays)
AD-I Adapter for PC Pedestal™ ..... 9.95 (for Princeton Graphics Systems and Quadchrome Displays)
SS-I System Stand ..... 24.95 (for IBM PC System Unit)
EC-I 3′ Extension Cable Set ..... 49.95 (for IBM PC Monochrome Display)
EC-II 3′ to 9′ Extension Cable ..... 39.95 (for IBM PC Keyboard)

Available at all ComputerLand Stores Entré Computer Centers ComputerMarts ComputerCrafts Micro Age or your local PC dealer. Over 800 locations nationally.

For the dealer nearest you call (603) 924-7803.

A101

Manufacturing Company, Inc.
CURTIS
Curtis Manufacturing Company, Inc.
Peterborough, NH 03458

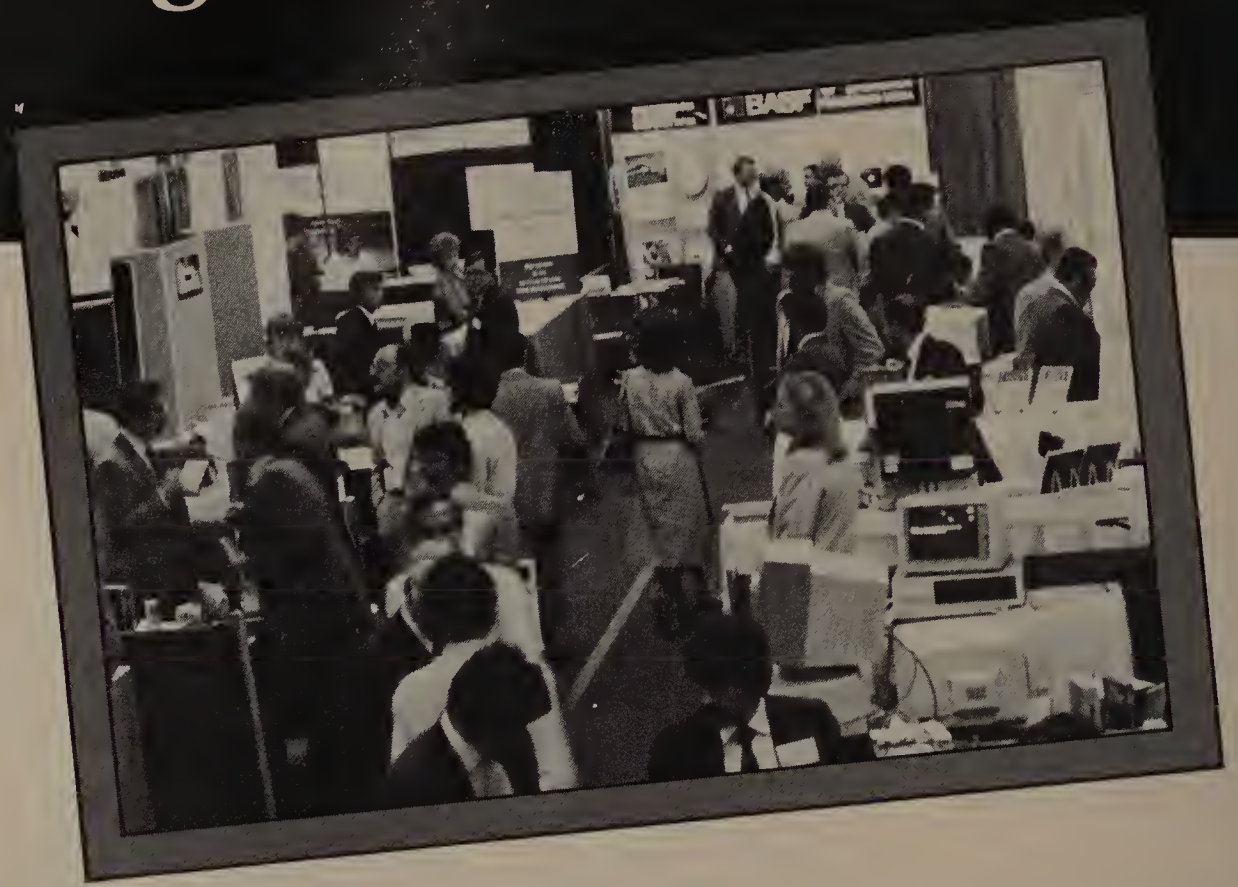
productive



be

Expansion Chassis Compliments of Tecmar Copyright© Curtis Manufacturing Co., Inc.

See the latest in microcomputers — from Apple to Wang — at EMCE Long Beach this October.



If you're involved with business use of microcomputers, then EMCE is the microcomputer conference and exhibition designed exclusively for you.

At EMCE, you'll see the latest in microcomputer systems, business software packages, printers, monitors and other peripheral equipment, computer accessories and related services. And you'll be able to meet face to face with computer professionals on an exhibit floor full of microcomputer products from leading hardware and software companies.

EMCE also offers you a complete conference program which will be held Thursday and Friday with special tutorials to be held all day on Wednesday.

Put EMCE on your calendar now! The Long Beach Convention Center in Long Beach, CA is the place; Wednesday, October 5 through Friday, October 7, 1983 are the dates. Exposition hours: 10-6, Wednesday through Friday.

If you're interested in exhibiting at EMCE contact Doris Rosner, Mitch Hall Associates, 1200 East Street, Westwood, MA 02090, (617) 329-8334.

Or, if you'd like more details on the conference program, contact Louise Myerow, CW Conference Management Group, Box 880, Framingham, MA 01701, (800) 225-4698. In Massachusetts, call (617) 879-0700.

EMCE

Executive Microcomputer Conference & Exposition

The Executive Microcomputer Conference & Exposition is sponsored by the Conference Management Group of CW Communications/Inc., publishers of Computerworld, InfoWorld, ISO WORLD and PC World as well as information systems publications in 21 countries around the world.

Reader Service #29



Powerbase for the powerhouse

At last: a completely new relational data base management system that fully utilizes and enhances the power of the best micro on the market today. And makes it available to those whose expertise is business, not computers.

We call it POWERBASE.™ Software clever enough to meet your information needs, easy enough to be mastered in half an hour. No fancy programming. No unnecessary computer jargon. You simply paint your screens and define the information you need. PowerBase does the rest. Pleasurably.

PowerBase introduces DATAZOOM™ and the exclusive Zoom Key which, at the touch of your fingertip, explodes data to deeper and deeper levels of revealing detail. Other features include ultra-fast b-tree access, multiple files, powerful editing and table look-up functions, flexible report writer, the ability to search, sort, and scan other files... and many more.

Master data without having to master computers. The power of the micro is now *fully* yours with PowerBase, the new breed of software that makes data management basically simple.

Reader Service #218

power-base™
with datazoom™



Call or write for our free informative brochure.



gmssystemsinc.
12 W. 37th Street N.Y., N.Y. 10018
(212) 947-3590
Dealer inquiries invited.

POWERBASE and DATAZOOM are trademarks of G M S Systems, Inc.

From $239



MegaPlus II™: THE ULTIMATE EXPANSION FOR IBM* PC OR XT

This **really** is the only board you need to expand your IBM PC or XT. There is quite a selection of multifunction boards available today, with many of their manufacturers trying to pile up the score of so called "functions". But when you look to see what they do you find some real creative definitions of "function" as well as some pretty useless features. MegaPlus II has the features you need on a board that is cost effective, versatile, and reliable. You can start out with the basics as standard equipment, and can add features as the need arises. Or you can get it all right now — in one slot.

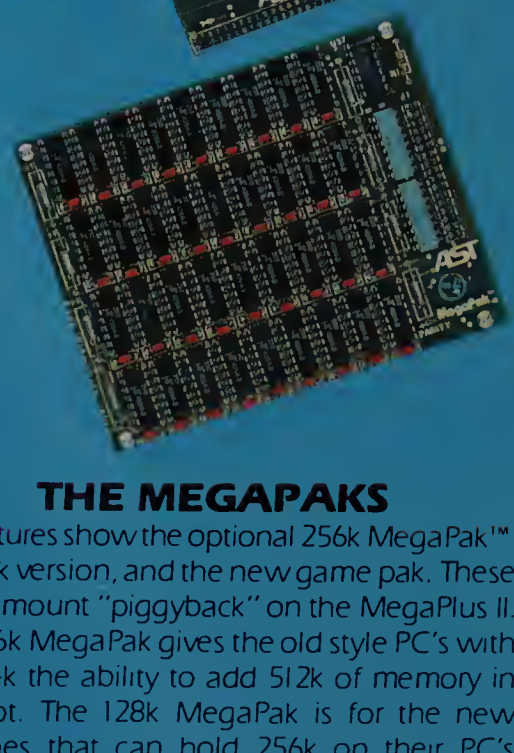
THE BASICS

MegaPlus II has three functions standard: Parity checked and fully socketed memory up to 256k in 64k increments, clock/calendar with battery back-up, asynchronous communication port (RS232C serial) which can be used as COM1 or COM2, (DTE for a printer, DCE for a modem). Also included are SuperDrive™ disk emulation and SuperSpooler™ printer buffer software. Optional is a 100% IBM compatible parallel printer port, and a second async port for another $35 each. Both options are socketed so you can add them later should the need arise.

CLOCK/CALENDAR & CLIP-ON BATTERY

Our clock is powered by a simple $4 lithium watch battery. It is clipped on, not soldered like some other clock boards. How useful is a battery warranty that requires you to send your board to the manufacturer to replace it? We send you a diskette with a program that sets the time and date when you turn on your computer. Now your programs will always have the correct time and date on them without you ever having to think about it. (Just which version of that program you were writing is the latest one?)





THE MEGAPAKS

The pictures show the optional 256k MegaPak™ the 128k version, and the new game pak. These boards mount "piggyback" on the MegaPlus II. The 256k MegaPak gives the old style PC's with only 64k the ability to add 512k of memory in one slot. The 128k MegaPak is for the new machines that can hold 256k on their PC's motherboard. This board along with the 256k on the MegaPlus II gives you the total of 640k, the maximum usable under 2.0 DOS. Now you can create disk drives in memory up to 360k, set aside plenty of space for print spooling, and still have plenty of memory for your biggest programs. There is a new game port MegaPak option. It uses any IBM compatible joysticks or paddles. It plugs onto the pin connectors just above the edge connector so you can add one even if you have one of the memory MegaPaks.

FREE SOFTWARE

SuperDrive™ disk emulation software creates "disk drives" in memory which access you programs at the speed of RAM memory. Super Spooler™ print spooler allows the memory to accept data as fast as the computer can send i and frees your computer for more productive work. Both programs are compatible with 1 and 2.0 versions of DOS.

CHEAP SOFTWARE TOO

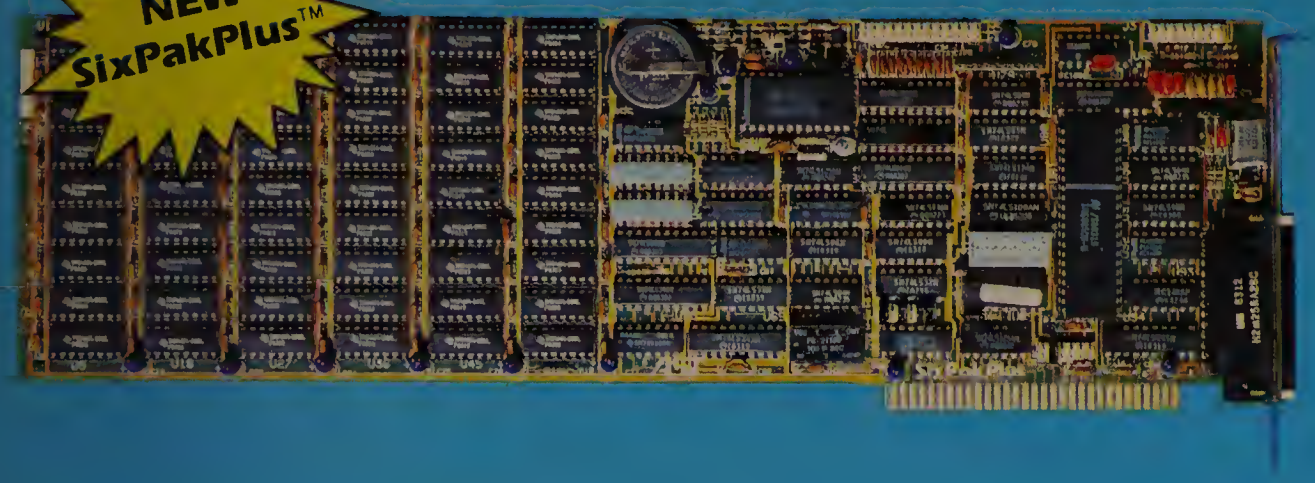
What good is great hardware without som great software to use it with? We offer som terrific prices on some of the popular program you will want to use your board with. Hov about the cream of the spreadsheet programs SUPERCALC², for just $159. Or maybe dBASE by Ashton-Tate for just $409. We now have th new standard for word processing programs SUPERWRITER for $179. It combines a ver powerful, yet easy to use word processin program with a spelling checker and the abilit to do mailing list/form letter generation.

WHY BUY IT FROM US?

Quality and Service. With over 100,000 boards i service AST Research is one of the leadin suppliers of enhancements for the IBM PC. A Qubie' we provide the service and suppor most companies just talk about. We realiz how integral this board is to the use of you computer. What good is a warranty if it take weeks for repairs to be made? We offer 48 hou turnaround or a replacement board on a warranty repairs. Do you hear anyone els making this promise? If you still are not con vinced, and want to compare prices, remember we don't charge extra for credit cards, o shipping. If you still want to buy elsewhere, as them if they will face the acid test.

THE ACID TEST

Qubie' (say cue-bee-A) gives you a 30 day satisfaction guarantee on all board purchases I you are not completely satisfied we will refund the entire cost of your purchase as well as pay the postage to return it. If you can get one of ou competitors to give you the same guarantee buy any other board you think compares and return the one you don't like. We're not worried because we know which one you will keep. We also offer a one year parts and labo warranty. An additional one year extended warranty is available for $50

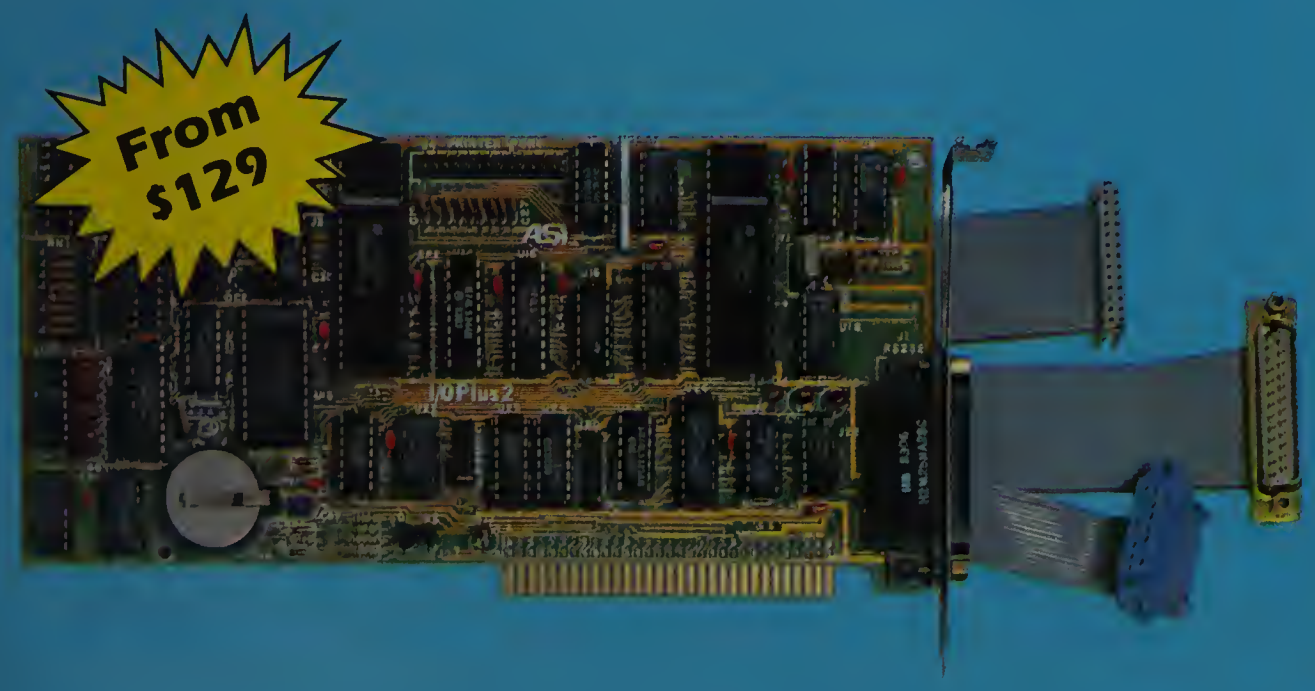


THIRSTY FOR A 384k MULTIFUNCTION BOARD? HAVE A SIXPAKPLUS™

Since the introduction of PC DOS 2.0, the capabilities of the PC have been increased with the ability to address up to 640k of memory. With the current PC having 256k available on the computer motherboard, you need another 384k to reach 640k. Great you say, but multi-function boards only have room for 256k on them. Enter the SixPakPlus™. Not only does it hold up to six banks of 64k parity checked RAM, but includes battery powered clock/calendar, serial port, parallel printer port, SuperDrive™, and SuperSpooler™ software standard. Optional is an IBM compatible game port. And of course you get the "Plus" of AST engineering and reliability, and the service and support of the largest dealer in the world for AST products.

SPECIAL OFFER

Buy a 384k SixPakPlus™ with game port and get a FREE ConnectAll cable bracket.



I/O-PLUS 2™: MEGAPLUS SANS MEMORY

Here is the answer for those who don't need additional memory but would like all those other quad function board features. The I/O-Plus 2™ comes standard with a clip-on battery powered clock/calendar, and asynchronous communication port (RS232C serial). Also included are the SuperDrive™ electronic disk and SuperSpooler™ print spooling software. Optional is a second asynchronous port (DTE for a printer, or DCE for a modem), a parallel printer adapter, and the best game paddle adapter on the market. What's so special about our game adapter? Not only is it an IBM standard game port, but it can also use low cost, widely available Apple compatible paddles and joysticks. And like its big brother MegaPlus II, all the options are socketed so you can buy them later if the need arises. So if your memory needs are satisfied, I/O-Plus 2™ gives you all the input and output ports you might need — for less than the price of most single function boards. 30 day satisfaction guarantee included.

TO ORDER BY MAIL INCLUDE:

—complete description of products requested
—daytime phone number
—California residents add 6% sales tax
—check or credit card number with expiration date (personal checks take 18 days to clear)

VISA master charge

TO ORDER BY PHONE:

In California (805) 482-9829
Outside California
TOLL FREE (800) 821-4479

PRICES:

I/O-Plus 2™ with Clock/calendar, serial (asynchronous) port, SuperDrive™ and SuperSpool™ - **$129**

MegaPlus II™ no memory, with clock, serial and software - **$239**

SixPakPlus™ no memory, with clock, serial port, printer port, and software: **$239**

Each 64k of memory installed and tested on MegaPlus, SixPakPlus or alone	$50
Parallel Printer Port	$35
Second Asynchronous Port	$35
Game Adapter (I/O or SixPakPlus)	$35
MegaPak™ with 256k of Memory	$299
128k of Memory	$199
GamePak for MegaPlusII	$40
ConnectAll Cable Bracket	$19
Cable to Parallel Printer	$35
Cable to Modem or Serial Printer	$25
Comprehensive Diagnostic Program	$10
Word Processing Keyboard	$229
Keyboard/Superwriter Package	$399
SUPERWRITER by Sorcim	$179
SUPERCALC² by Sorcim	$159
dBASE II by Ashton-Tate	$409

SHIPMENT

Normal shipment is day after receipt of order. We pay UPS surface charges on all items except keyboards. For keyboards add $5 for surface, $10 for 2 day air. All COD shipments add $3 handling.

QUANTITY PURCHASES?

If your corporation, institution, or users group has needs for quantities of boards, call us for details on our quantity purchase program.

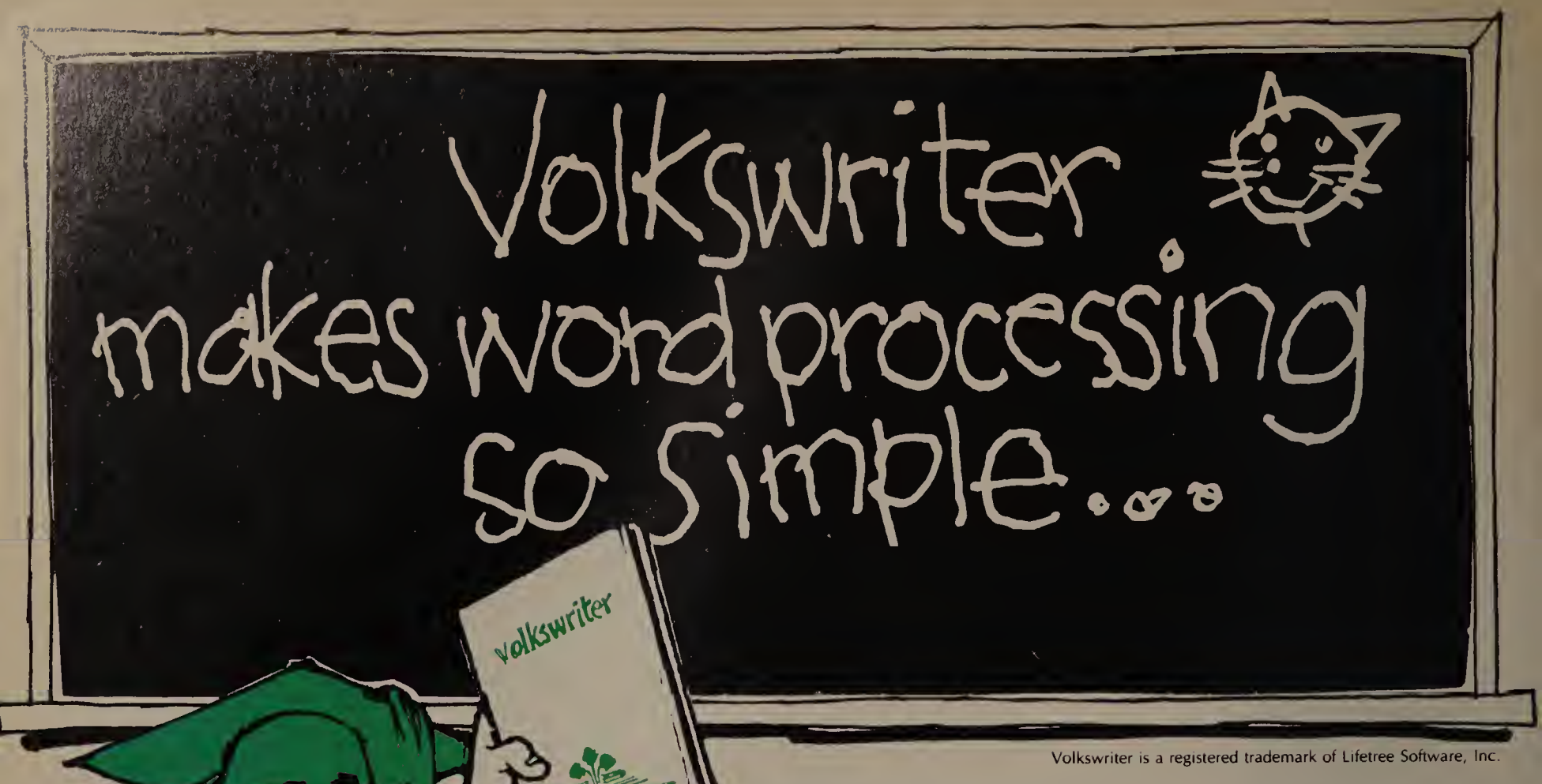
*IBM is a trademark of International Business Machines

Reader Service #151

QUBIE' DISTRIBUTING

USA:
4809 Calle Alto
Camarillo, CA
93010

EUROPE
Tempo House
15 Falcon Road
London SW11, UK



Volkswriter is a registered trademark of Lifetree Software, Inc.

...you may forget to read the instructions.

✔ You learn to use Volkswriter right on the screen of your IBM Personal Computer or compatible. The lesson is in plain English. And in minutes, you're a pro.
Simple.

✔ When you need extra help, you don't even have to ask. Volkswriter tells you which key to press to perform your chosen task. One task, one key.
Simple.

✔ Volkswriter is ready to use with 1-2-3, other IBM or compatible software, and your own. You just slip it in.
Simple.

✔ Volkswriter allows you the opportunity to use fifteen top printers—without having to do any reprogramming.
Simple.

✔ When you buy Volkswriter for $195, you're getting word processing that's faster, more responsive and simpler to use than others selling for over twice the price.
Smart.

✔ And in case you're still wondering which word processor is your wisest choice, the answer is simple.

LIFETREE SOFTWARE, INC.
brings the world within your reach

411 Pacific St., Suite 315 / Monterey, CA 93940 / (408) 373-4718
Reader Service #93

volkswriter®

The word processor for your
IBM Personal Computer or compatible

HAYDEN...the source

Cryptanalysis for Microcomputers (Foster) Crack and create secret codes with your micro! An introduction to using microcomputers for solving cryptograms and cryptographic systems. Three BASIC programs are discussed: the first converts plaintext to ciphertext, the second converts ciphertext to plaintext, and the third uses mechanical aids and standard attacks on cryptograms. **#5174, $14.95**

Codes, Ciphers, and Computers: An Introduction to Information Security (Bosworth) Describes the fundamentals of secret communication and provides an understanding of computer security through cryptography. Details and illustrates traditional cryptography techniques developed before computers, and discusses more recent concepts for the highest levels of information and data security. **#5149, $14.95**

Microcomputer Systems: Hardware / Software Design (Blasewitz and Stern) Emphasizing the design and integration of microcomputer systems and peripherals, this book offers a complete look at the world of microprocessor design and application. The book zeros in on information needed to become proficient in the design and use of microcomputers. **#5123, $27.50**

CP/M® Revealed (Dennon) Intended for CP/M users interested in improving their skills, this book is a guide to the CP/M operating system: the console monitor (CCP), the system manager (BDOS), and the input/output driver package (CBIOS). In addition to providing a clear understanding of the data structure of the CP/M disk and other essentials for using CP/M effectively, the text fills many of the information gaps left by the Digital Research CP/M manuals. Covers booting up, logging in, changing memory size, mapping disk space, calling all programs, and more. **#5204, $13.95**

Using Microcomputers in Business (Veit) Essential background briefing for any purchaser of microcomputer systems or software. In a fast-moving style, without the usual buzzwords and technical jargon, Veit answers the most often asked questions. **#5152, $10.95**

The 8086/8088 Primer: An Introduction to Their Architecture, System Design, and Programming, 2nd Ed. (Morse) Written by the man responsible for the design of the 8086 microprocessor. Updated to provide novices and professionals alike with a thorough introduction to Intel's 8086 and 8088 microprocessors. **#6255, $11.95**

The Investor's Computer Handbook (Packer) A valuable guide to help you manage your investments better using your micro. NO PREVIOUS MICROCOMPUTER EXPERIENCE IS NEEDED. Offers advice on choosing the system best suited to your particular investment applications, including information on hardware, software, peripherals, and a list of required and recommended components. The programs and principles discussed—primarily in terms of the stock market—transfer easily to other dynamic markets and portfolios, such as commodity futures and options, bonds, and treasury bills. **#5203, $11.95**

How to Cope With Computers (Logsdon) An entertaining yet informative discussion of the impact of computers on our daily lives and the future of our society. Includes a brief history of the computer, explanations of hardware and software, and an introduction to programming in BASIC. Provides an overview of computer career opportunities. **#5193, $7.95**



Available at your local computer store or

Phone 1-800-631-0856

operator IPC 53 • In NJ call 201-843-0550, ext. 382



Hayden

Mail to: Dept. #IPC 53 • Hayden Book Company, Inc
50 Essex Street • Rochelle Park, NJ 07662

Please send me the book(s) indicated below by code number. If I am not completely satisfied I may return the book(s) undamaged within 10 days for a complete refund.

☐ Enclosed is my check or money order.

Please bill my ☐ Visa ☐ MasterCard Expires _____

Name _____

Address _____

City _____ State _____ Zip _____

Visa / MasterCard # _____

Signature _____ B412

We pay postage and handling. Residents of NJ and CA must add sales tax.

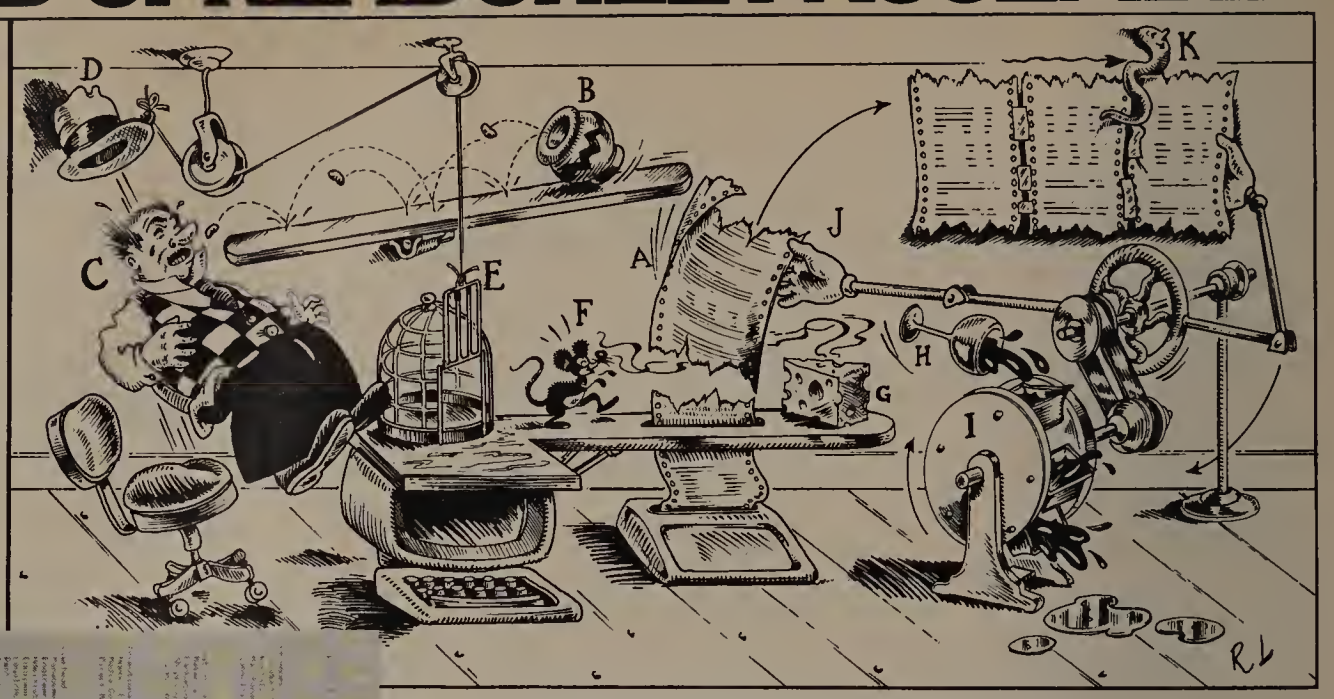
SIMPLIFIED SPREADSHEET ASSEMBLY

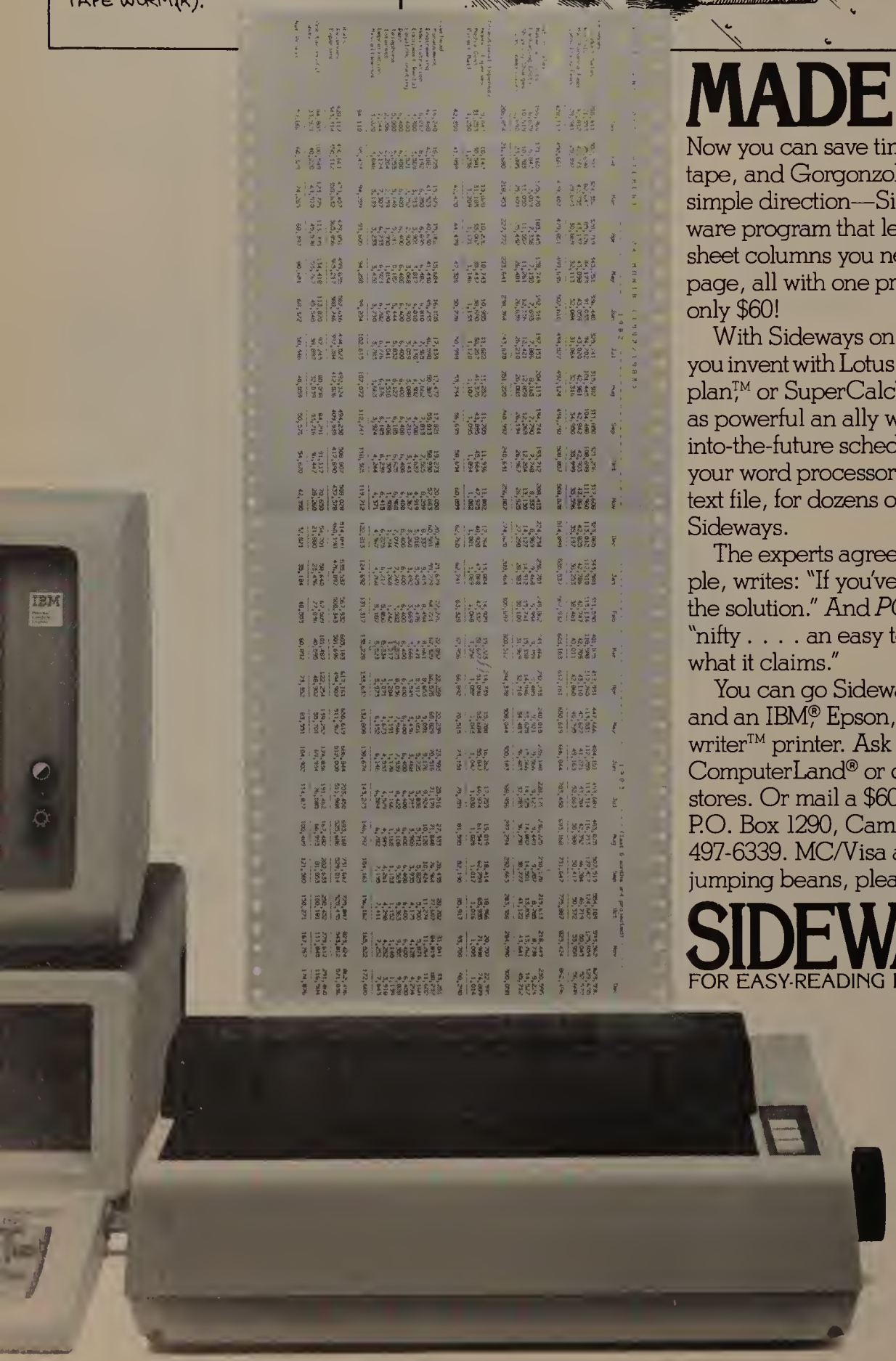
RISING SPREADSHEET (A) KNOCKS MEXICAN JUMPING BEANS (B) INTO MOUTH OF NEUROTIC MAN (C) WHO IS SO DISCOMBOBULATED THAT HIS HAIR STANDS ON END, DISLODGING HAT (D) WHICH OPENS CAGE (E) AND RELEASES EPICUREAN MOUSE (F).

MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED CAMEMBERT CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY AROMA OF OVER-RIPE GORGONZOLA (G).

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).





MADE SIMPLE.

Now you can save time, aggravation, adhesive tape, and Gorgonzola cheese by following one simple direction—Sideways. It's the unique software program that lets you output all the spreadsheet columns you need, all on one continuous page, all with one print command—and all for only $60!

With Sideways on your side, no spreadsheet you invent with Lotus 1-2-3,™ VisiCalc,® Multiplan,™ or SuperCalc™ is too wide! And it's just as powerful an ally when you're creating far-into-the-future schedules and pert charts with your word processor. In fact, for any wide text file, for dozens of uses, the way to go is Sideways.

The experts agree. *PC* Magazine, for example, writes: "If you've got the need, Sideways has the solution." And *PC World* calls Sideways "nifty . . . . an easy to use program that does what it claims."

You can go Sideways today with an IBM® PC and an IBM,® Epson, Okidata, Prism,™ or Prowriter™ printer. Ask for Sideways at your local ComputerLand® or other leading computer stores. Or mail a $60 check to Funk Software, P.O. Box 1290, Cambridge, MA 02238. (617) 497-6339. MC/Visa accepted. Send no Mexican jumping beans, please.

SIDEWAYS™
FOR EASY-READING HARD COPY

Reader Service #74

This One Decision Saved our Business and Grossed over $1,000,000. in Sales

In 1979, our recreational manufacturing business was booming. And we had developed a new product that looked like a real winner. The new product was extremely important, in that it appeared to be the answer to a seasonality problem associated with our other product lines.

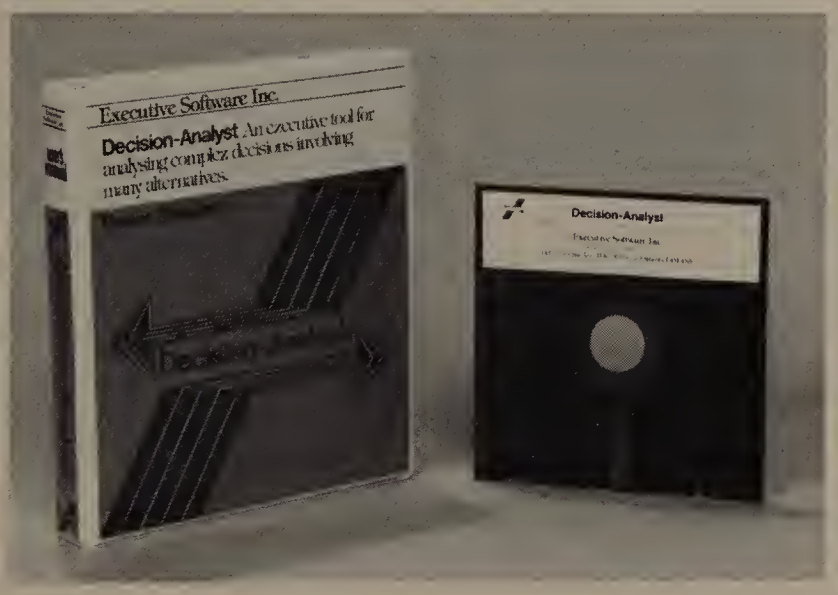
By early summer, our order book was bulging. It really looked as if our off-season sales and production problems were over. Then just as quickly the roof fell in. Gas shortages devastated the recreational vehicle market overnight. And our order book for over two million dollars worth of the new product disintegrated.

Faced with a fall and winter of virtually no sales, many thousands of dollars of unneeded parts and excess production staff, I had no choice but to shut down the production lines. And if a solution to our problem could not be found, the business itself was in jeopardy.

A life saving decision

I spent many sleepless nights trying to come up with a solution to this nightmarish situation. Then I remembered a course I had taken in decision analysis. I spent the rest of that night reviewing course material and other books I had bought on the subject. The next day, I called an emergency meeting.

Using the decision making techniques I had learned, we spent the rest of the week searching for and analysing potential solutions. The net result was that not only was the company pulled back from the brink of destruction, but we added over $1,000,000.00 in gross sales during that off-season.



A way of life

From that point on, almost every critical decision (and there were many) regarding new products, marketing channels, pricing, advertising, production equipment, engineering projects, received this same type of analysis.

Although the process was very time consuming and clumsy, because it had to be done by hand, our decisions were much improved. And there were some real benefits that we had not anticipated.

1. Our understanding of each problem was greatly increased.
2. We uncovered opportunities that we would not have thought of in any other way.
3. Our decisions were documented, preventing us from slipping off the selected path or 'rehashing' the same things over and over.
4. Consensus became easier because we were forced to focus and resolve each part of the problem, one piece at a time.

The birth of Decision~Analyst™

Decision~Analyst was created because the process of evaluating complex decisions with multiple alternatives and many criteria is very tedious and time-consuming if you do it on paper. And doing it in your head is virtually impossible.

Any complex decision usually requires multiple revisions to criteria, alternatives, weights and values assigned to them. If done manually, the ordeal of rewriting, recalculating and redocumenting tends to discourage revisions, thus producing poor results.

Decision~Analyst overcomes these problems by asking for the minimum input possible from you, in the correct sequence. It leads you step by step through the decision making process, then does all the necessary calculations and produces polished reports without any further effort. And all of your input is stored on your disk so that revisions and updates can be made easily at any time.

Comprehensive but easy to use

Decision~Analyst is probably the easiest program you'll ever use. You can literally learn to operate the program using only the 'help' screens. But it comes with a thoroughly indexed manual which includes many pages of examples plus a step by step guide to the decision making process.

And Decision~Analyst is no fly-weight. It uses over 100,000 bytes of fast compiled code and a 40,000 character help file. The program is extremely 'bullet proof' and does all the work . . . you do the thinking. And there is no danger of missing a critical step because your analysis is guided through each of the eight menu-driven sections.

Endless opportunity for use

If you're saying to yourself that you really don't have any earth shattering applications for Decision ~Analyst . . . then consider this. If you're in business, chances are that the most important thing you do is make decisions.

Decision~Analyst can help you select key personnel, decide on new machinery or equipment, prioritize major projects and allocate resources, choose a new product or a better price strategy, select new offices or plant locations, select the most profitable marketing channel or the best piece of computer hardware or software. Use it to analyse any decision which has more than one viable alternative.

In your personal life, it can help you choose the best job, select the right business, career or franchise, determine the best field of investment or even the right home, boat or car. In fact, improving your decisions is probably the most rewarding thing you can do.

Let us help you make a $139.00 decision

If there's a chance that Decision~Analyst could help you improve even one decision, would it pay for itself? Chances are it would. In fact, it's likely that it could save you the price many times over!

So why not take advantage of this special $139.00 introductory price (plus $5.00 shipping) by calling us today? We'll even refund your money, within 30 days, if you're not completely satisfied.

Decision~Analyst requires a CP/M or MS-DOS operating system, 52K of RAM, a 24 × 80 column screen and an 80 column printer for your reports. Order by calling collect to . . .

Executive Software Inc.

705-722-3373

Two North State Street, Dover, Delaware 19901

ad# 1021 DA5

* CP/M is a registered trademark of Digital Research Inc * MS-DOS is a registered trademark of Microsoft Corp ™ Decision~Analyst is a trademark of Executive Software Inc © Copyrighted 1983 by Executive Software Inc

Reader Service #269



If you think $1495 for a 10 Mbyte high quality hard disk is a good deal, then wait until your computer dealer tells you about our $695 25 Mbyte tape back-up.

The Pegasus 10 comes complete with all the software and hardware you need to start operations.

If you've outgrown the storage capabilities of your IBM PC or compatible computer but haven't grown into the giant pricetags on 10 Mbyte hard disk systems, you're in for a surprise.

The price on a complete 10 Mbyte system featuring the latest Shugart components just reached an all time low!

For the first time, just $1495 gets you everything you need to start working on your hard disk system:

- Top quality SA612 10 Mbyte (formatted) fixed hard disk (ST506 compatible)
- SASI controller card
- Software that runs on DOS 1.1 and 2.0, CP/M 86
- Host adapter
- Integral power supply
- Cables
- External custom chassis with additional space for either our tape backup, another hard disk, or floppy disk drive.
- One year warranty

What's the catch?

There is none. It's a simple matter of economics. Pegasus saw the growing need for mass storage, made a commitment to fill this need, purchased thousands of the finest quality hard disks, and is now passing the good deal along to you.

The only thing you may be missing in buying the Pegasus instead of the IBM XT expansion chassis is something you may not need in the first place: eight expansion slots, a communications card, three little initials, and an extra $2,000 out of your pocket.

What about support?

Pegasus and your dealer stand behind every Pegasus 10. If your unit requires maintenance anytime during the one year warranty, simply return it to your dealer for repair at no charge for parts or service.

But don't I need a tape backup?

We recommend it! That's why we're offering you the same great deal on a ¼" cartridge tape backup. We've watched other companies offer 10 Mbytes of storage and forget about the backup altogether. Our tape backup, which carries a 90 day warranty, retails for just $695 — a small price for over 25 Mbytes of formatted storage and lots of peace of mind.

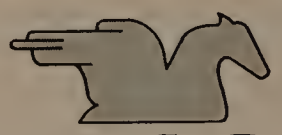
Where can I buy a Pegasus 10 Mbyte system?

Pegasus systems are available only through dealers. So contact the dealer in your area who sells IBM PC or compatible computers. If he doesn't have Pegasus, chances are he'll carry it soon. Just ask him to call us. We will ship him your Pegasus 10 immediately.

Does Pegasus have larger storage systems?

Absolutely. 27, 65, and 140 Mbyte systems are soon available from Pegasus. And the best part is that they, too, are breaking new ground when it comes to pricing. If you've outgrown 10 Mbytes of storage, ask about the larger capacity units. All with the same top quality hardware and software and full one year warranty.

Shugart SA612 Hard Disk Specifications	Cipher 525-CT Tape Drive Specifications
12.95 Mbytes unformatted	32 Mbytes unformatted
10.416 Mbytes formatted	28 Mbytes, 1024 byte sectors
5.0 Mbits/set transferrable	6 recording tracks
16.2 msec access time track to track	Transfer rate (read/write) 500 Kbits/sec
92 msec access time average	78 ips streaming
345 tracks/inch	¼ inch tape cartridge (3M DC 60A)
Mean Time Between Failure: 11,500 power on hours	Standard floppy disk interface (SA450 or SA 850)

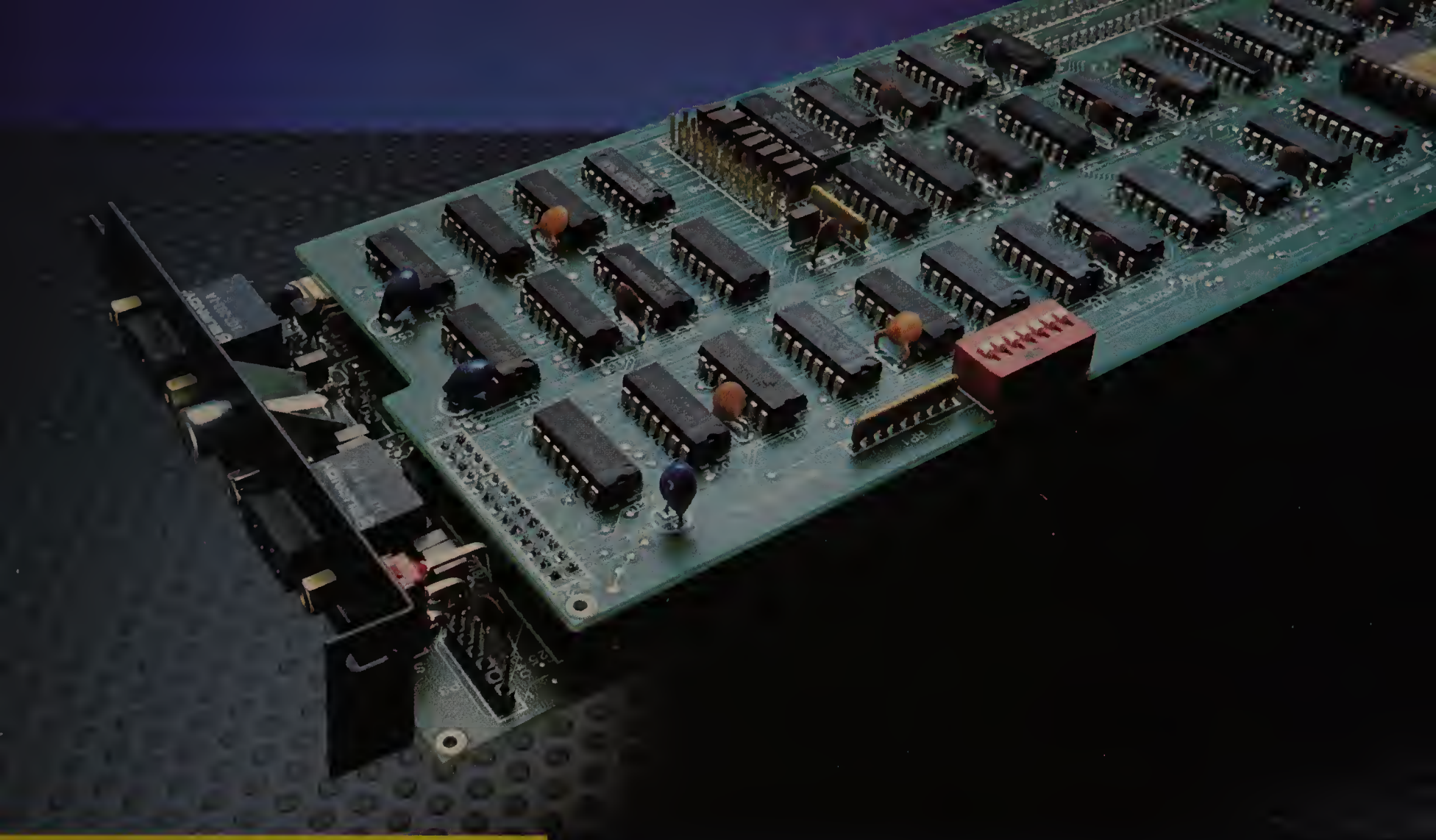


PEGASUS

2200 West Higgins Road • Suite 245
Hoffman Estates, IL 60195 • (312) 843-1090

Dealer inquiries invited.

Reader Service #411



USI MultiDisplay Card™ offers: IBM Monochrome support, Color/ Graphics support and Parallel Printer Adaptor all on a single expansion card.

Other features include:

Flicker-free scrolling (no more flashing during scroll)

Full 32K on board memory (creates an extra page of hi-res graphics)

External switch (or software) selects color or mono modes.

True DMA capabilities in all modes.

May be used in conjunction with another MultiDisplay Card or IBM Video Card for simultaneous Display on Monochrome and Color Monitor.

Until now, two expansion boards were required to have the options of using an IBM Monochrome and a composite video or RGB monitor. By putting these two functions plus a printer adaptor on one board, the USI MultiDisplay Card leaves one more slot open for future expansion and costs less.

Look for the USI MultiDisplay Card at your local computer dealer.

USI

USI Computer Products
A Division of USI International
71 Park Lane, Brisbane, CA 94005
Telephone: 415-468-4900

USI products include video monitors, HES products and the OptoMouse. Dealer inquiries invited.

Reader Service #192

Reader Friendly

PC WORLD

The Complete Magazine for IBM Personal Computer and IBM PC Compatible Users.

You are using or **soon plan to use** an IBM Personal Computer or IBM-compatible personal computer. You've just scratched the surface, just started to explore the vast potential of this remarkable machine.

How can you use this potential and get more out of your PC? How can you keep pace with the fast-moving news and developments in the field, with the rapidly growing body of available software and the new ideas, discoveries, applications, and innovations?

Now there's a way—with **PC WORLD**, the lively, authoritative, new magazine devoted exclusively to IBM PC and IBM-compatible PC users.

Every month **PC WORLD** will keep you posted on the most interesting, intriguing, and potentially useful applications for the IBM PC and compatible PCs. And it will explain them to you with a minimum of technical jargon—and with a degree of clarity you'll appreciate if you try them out on your own PC.

It's a magazine that will help you get more of everything you want out of your PC—utility, versatility, value, and satisfaction. And it will present you with well researched, scientifically correct, easy to read articles in magnificently designed issues that are beautifully illustrated in full color. You'll want to keep each one for your future reference—beginning right now.

Now for a limited time only you can take advantage of this low introductory rate and save 47% off the newsstand price for **PC WORLD**. Enter your subscription today and you will receive three FREE issues—for a total of 15 monthly issues at the low introductory rate of only $24. If you're not completely satisfied with **PC WORLD**, you may cancel your subscription and receive a full refund on all unmailed issues.

If you already have an IBM Personal Computer or are thinking of buying one, this is the magazine that revolves around you.

15 issues for $24
27 issues for $39
39 issues for $53

VISA and MasterCard orders call: 800/247-5470 (800/532-1272 in Iowa)

Subscribe Now

Don't miss our low introductory rate:

- 15 issues—3 Free
- Save 47% off the newsstand price

This is a limited time offer...act now to avoid disappointment!

CHARTER PRICES:
15 issues, $24.00
27 issues, $39.00
36 issues, $53.00

PC WORLD
Subscription
Department
P.O. Box 6700
Bergenfield, NJ 07621

Toll-free order lines, for VISA and MasterCard orders: 800-247-5470 (in Iowa call 800-532-1272)

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621 J2070

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621 J2070

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621 J2070

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

Subscribe Now

Don't miss our low introductory rate

This Programming professional deserves a lot more from his personal computer.

He's earned it. As a seasoned professional, he's learned to master some of the world's most advanced programming tools. Tools specially designed to meet the everyday demands of programming experts.

But as the owner of a personal computer, he's come to expect less. Less performance. Less sophistication. And less flexibility.

Why should programming a personal computer be any different?

Prior to the announcement of micro/SPF™ development software, experienced programmers felt programming a personal computer was a lot like playing with a toy. You couldn't take it seriously.

But today, there's micro/SPF,™ a solution to elementary program editing tools now offered with most micro-computers.

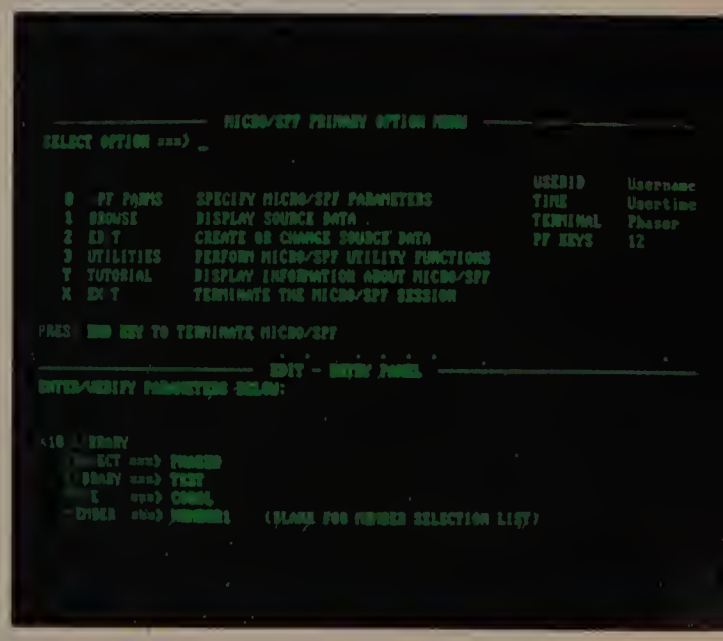
With micro/SPF™ you get the same procedures and commands experienced programmers are accustomed to using at work. By mimicking features found in standard SPF software, micro/SPF™ provides all the sophisticated utilities programming professionals expect.

Programming experts can take advantage of skills they've spent years perfecting.

Now, for the first time, mainframe software is available for personal computers. SPF screens are fully reproduced in logical sequence and each screen is formatted identical to those found in the SPF system.

In addition, micro/SPF™ comes equipped with the same primary and line commands, tutorial messages and program editor (with program function keys) experienced programmers are used to.

Programming professionals who've spent years perfecting the art of writing sophisticated code deserve to work with state-of-the-art tools, not toys. Find out how micro/SPF™ can help you do work-compatible programming on your personal computer today!



PHASER

PHASER SYSTEMS, INC 24 CALIFORNIA STREET
SAN FRANCISCO, CA 94111
415/434-3990

Reader Service #244

We Interrupt This Program

Stuart Greenberg

If your application demands speed but you're not ready to code a full program in assembly language, merging assembly language routines into BASIC programs may be the answer. You can use the subroutines in this article with your BASIC programs to move blocks of data quickly and to create and store screens.

It was not so long ago that microcomputers were built from kits rather than bought as prepackaged systems. You had to be willing to get a little closer to the machine in those days. Today many people who use personal computers don't have that sort of intimate understanding of their machines. Perhaps you can imagine a little man inside the machine carrying a bucket of bits and waving a bit-bat to move data around with speed and precision. By listening closely you might also hear him say, "We interrupt this program for an important subroutine." You'd have to listen very fast, of course,

> If the direction chosen is forward, the addresses are incremented by one each time a byte is moved.

since subroutines are invoked and exited many times in a fraction of a second. Even when your machine is seemingly dormant but awaiting input, an array of subroutines is being executed just to let the operating system know that there is nothing to do.

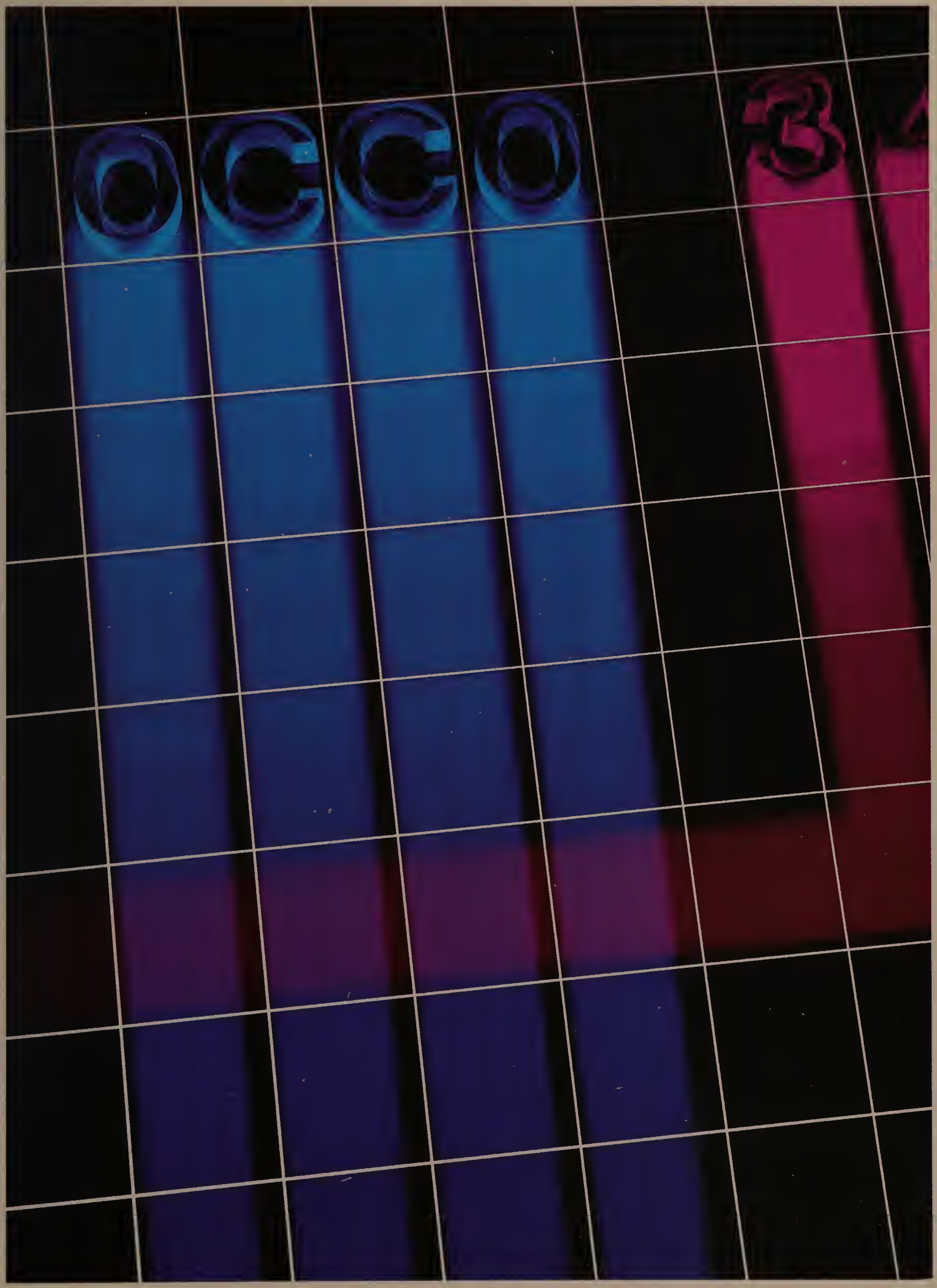
Now that you have an idea of the frequency with which subroutines occur in systems software, consider the important part that subroutines play in your own programs. In a well-structured program, subroutines create the foundation upon which the main processing part of the program stands. If these subroutines are written to be sufficiently general, they can be used for many purposes by different programs. This technique can save a substantial amount of time, since you are documenting a general subroutine once instead of writing and maintaining documentation for several specific routines.

In my day-to-day programming I draw from a library of several general subroutines when I "build" a program. Most are in BASIC, but some are in assembly language. I add a routine to this library whenever I feel that it would be of general use. One of these subroutines is written in assembly language and is called BMOVE.

Moving Blocks

BMOVE is short for block move and, as the name suggests, it will move a block of data from one location in memory to another. The block move instruction was introduced to the microcomputer world by the Z-80 microprocessor chip. This chip included two instructions, LDIR and LDDR, that would move data from an area pointed to by one register to an area pointed to by another register and automatically loop until a third register counted down to zero. The increase in speed achieved by using these instructions was dramatic, and it was immediately exploited. For example, many TRS-80 games and other programs use block move routines to move data quickly from memory to screen and vice versa.

Naturally, when 16-bit microprocessors were designed, the block move command was designed into them. Pointers to the source and destination areas and a count of bytes are simply loaded into registers (storage locations in the 8088), and the block move instruction (REP MOVSB) takes care of the rest. This coding was designed to be easy to implement, but the subroutine presented here is complicated slightly by passing variables from BASIC.



```
1                       NAME BMOVE
2                       PAGE 60,132
3                       TITLE   .     BMOVE - BASIC BLOCK MOVE ROUTINE
4
5             ; BMOVE - Basic Block Move Routine
6             ;      Written by Stuart Greenberg
7             ;         Copyright May,1983
8             ;          May not be copied for commercial use!
9
10            ; Called by Basic Program As Follows:
11
12            ; CALL BMOVE%(FROMSEG%,FROMOFF%,TOSEG%,TOOFF%,COUNT%,DIRECTION%)
13
14            ; Where:
15
16            ; FROMSEG%=source segment
17            ; FROMOFF%=source offset
18            ; TOSEG%=destination segment
19            ; TOOFF%=destination offset
20            ; COUNT%=number of bytes to move
21            ; DIRECTION%=direction of move (0=forward, all others=backward)
22
23  0000        STACK_AREA      SEGMENT STACK
24  0000        STACK_AREA      ENDS
25
26  0000        CODE_AREA       SEGMENT
27
28              ASSUME CS:CODE_AREA, SS:STACK_AREA
29  0000        BMOVE           PROC        FAR
30
31  = 0006      NUM_ARG     EQU     6
32              ;                           Offset of Pointer to:
33  = 0010      FROM_SEG    EQU     (NUM_ARG-1)*2+6 ;       FROMSEG%
34  = 000E      FROM_OFFSET EQU     (NUM_ARG-2)*2+6 ;       FROMOFF%
35  = 000C      TO_SEG      EQU     (NUM_ARG-3)*2+6 ;       TOSEG%
36  = 000A      TO_OFFSET   EQU     (NUM_ARG-4)*2+6 ;       TOOFF%
37  = 0008      COUNT       EQU     (NUM_ARG-5)*2+6 ;       COUNT%
38  = 0006      DIRECTION   EQU     (NUM_ARG-6)*2+6 ;       DIRECTION%
39
40  0000 55         PUSH    BP                      ; Save BP
```

Listing 1

The sample programs presented later in the article show you how to use the BMOVE subroutine to fill an integer array with a value, move part of an integer array up or down, save screen images in memory, and flash stored screen images back to the screen. The application section of the article describes how the subroutine might be used.

How It's Done

Don't let the fact that BMOVE is in assembly language bother you. Knowledge of assembly language is not required for use of BMOVE, but even novices should try to follow the detailed explanation that follows.

BMOVE (see Listing 1) was written using a framework common to all of my assembly language subroutines. This framework is based on one that appeared in issue 1.7 of *Revolution,* the newsletter of the Autumn Revolution Users' Group, and it produces very clear and well-formatted code. Consider the framework line by line as you examine the actual details of the code.

Lines 1 through 3 specify the name of the routine and printing options to the assembler. Unfortunately, space will not permit a thorough tutorial on assembly language. NAME, PAGE, TITLE, and other specific items not described in detail here are described in the IBM *Macro Assembler* manual.

```
41  0001 8B EC      MOV     BP,SP                   ; Put SP in BP
42
43  0003 FC         CLD                             ; Set-up for Forward Direction
44  0004 8B 5E 06   MOV  BX,[BP]+DIRECTION          ; Get Pointer to DIRECTION%
45  0007 83 3F 00   CMP  WORD PTR [BX],0            ; Is Direction Forward?
46  000A 74 01      JE   SET_REGS                   ; YES-Don't Change Direction Flag
47  000C FD         STD                             ; NO - Set-up for Backward
48                                                  ; Direction
49  000D            SET_REGS:
50  000D 8B 5E 0E   MOV     BX,[BP]+FROM_OFFSET     ; Get Pointer to FROMOFF%
51  0010 8B 37      MOV     SI,[BX]                 ; Store Value in SI
52  0012 8B 5E 0C   MOV     BX,[BP]+TO_SEG          ; Get Pointer to TOSEG%
53  0015 06         PUSH    ES                      ; Preserve ES Register
54  0016 8E 07      MOV     ES,[BX]                 ; Store Value in ES
55  0018 8B 5E 0A   MOV     BX,[BP]+TO_OFFSET       ; Get Pointer to TOOFF%
56  001B 8B 3F      MOV     DI,[BX]                 ; Store Value in DI
57  001D 8B 5E 08   MOV     BX,[BP]+COUNT           ; Get Pointer to COUNT%
58  0020 8B 0F      MOV     CX,[BX]                 ; Store Value in CX
59  0022 8B 5E 10   MOV     BX,[BP]+FROM_SEG        ; Get Pointer to FROMSEG%
60  0025 1E         PUSH    DS                      ; Preserve DS Register
61  0026 8E 1F      MOV     DS,[BX]                 ; Store Value in DS
62
63  0028 F3/ A4     REP     MOVSB                   ;Do Move: [DS:SI] -> [ES:DI]
64                                          ; CX <- CX - 1
65                                          ; DS:SI <- DS:SI +/- 1
66                                          ; ES:DI <- ES:DI +/- 1
67                                          ; Repeat Until CX = 0
68
69  002A 1F         POP     DS              ; Restore Segment
70  002B 07         POP     ES              ; Registers
71  002C 5D         POP     BP              ; Restore BP
72
73  002D CA 000C    RET     2*NUM_ARG       ; Return
74
75  0030            BMOVE   ENDP
76
77  0030            CODE_AREA       ENDS
78
79                  END     BMOVE
```

The comments on lines 10 through 21 list the BASIC variables and show the call statement necessary to invoke BMOVE from a BASIC program. Notice that the type of BASIC variable is shown by suffixing the variable name with the appropriate character; in this case a percent sign indicates an integer variable. Different types of BASIC variables require different amounts of storage space. The suffix is a reminder to use the proper assembly language instructions when you are accessing each variable, and it also helps you avoid using the wrong variable type in a BASIC program that calls the routine. It may not seem important when you first code the routine, but this documentation proves very handy when you need to write a program to call the routine a month or a year later.

The *Macro Assembler* allows programs to be divided into manageable parts, called segments. Each segment can be up to 64K in length and is pointed to by each of four segment registers. One such segment that BMOVE must define is an area in memory for temporary storage, called the stack segment. Pointers to the BASIC variables and a return vector to BASIC are in known locations (offsets) in the stack segment when BMOVE gets control. BMOVE can also use the PUSH and POP commands (described later) to save and restore the contents of the 8088's registers via the stack.

Since BASIC defines and maintains a stack of sufficient size, all BMOVE has to do is name an area and tell

the assembler that the Stack Segment (SS) register already points to it. The statements in lines 23 and 24 of Listing 1 take care of the former, and the SS:STACK_AREA specification in the ASSUME statement (line 28) accomplishes the latter. The ASSUME statement also tells the assembler that the Code Segment (CS) register will be pointing to the BMOVE code segment, which begins at line 26, when the subroutine is invoked from BASIC. The other two segments, data and extra, do not need to be defined since BMOVE will not access them directly. The Data Segment (DS) and Extra Segment (ES) registers will be pointing to BASIC's data segment when BMOVE is invoked from BASIC. BMOVE will find the passed variable values via the DS register and will alter the DS and ES registers later on to point to the source and destination memory blocks.

The PROC statement (line 29) indicates the beginning of a block of related code called a procedure (PROC for short). The FAR operand of the PROC statement is required for procedures called from BASIC programs. It tells the assembler that both the segment and offset addresses were used to invoke BMOVE. BASIC uses the

The order of the POP instructions is opposite that of the PUSH instructions.

DEF SEG = and CALL statements, respectively, to define these values. The Return (RET) statement in line 73 uses this information to generate the code needed to return to BASIC. A version of CALL and RET uses only the offset address (NEAR), but BASIC is not able to use that type of addressing for calling subroutines.

Lines 31 through 38 assign values to variable names that will be used within the code that follows that section. There are several reasons for doing this. If a value is used in many places throughout the code but may be changed in the future, assigning it a name enables you to change only the line defining the name and have the assembler automatically assign the new value wherever the name is used. A name might also be assigned if repeatedly using an expression to represent a value would require an excessive amount of typing or if the name would be easier to understand than the expression would be when you are reading the code. The result of each expression in lines 33 through 38 is the offset from a known location in the stack segment, stored in the Stack Pointer (SP) register, where a pointer to the actual passed data is stored. The derivation of this expression is described in Appendix C of the BASIC manual.

At last we come to some executable code! In lines 40 and 41 the original value of the Base Pointer (BP) register is saved on the stack (PUSHed) and given the value of the SP register. The SP register points to the position in the stack where our variable pointers were stored by BASIC; now BP points there too.

BMOVE can move a block of data either forward or backward through memory. The application section of this article discusses the importance of the direction of a block move. Lines 43 through 47 in Listing 1 set or reset an indicator in the 8088 called the direction flag. If the value for the BASIC variable DIRECTION% were zero, the direction flag would be cleared (indicating forward movement); otherwise it is set (indicating backward movement). The program first assumes a forward direction with the Clear Direction Flag (CLD) instruction in line 43. Line 44 loads the pointer to DIRECTION% into the BX register. The sample program uses the BX register for intermediate storage, but any unused register would have done just as well. Line 45 refers to the actual value of DIRECTION% as the two bytes (WORD) pointed to (PTR) by the Base register (BX). If DIRECTION% is equal to zero, the Jump If Equal (JE) instruction in line 46 will bypass the Set Direction Flag (STD) instruction in line 47; otherwise the STD instruction will be executed and a backward move will be indicated to the 8088.

The BASIC variables are loaded into the proper 8088 registers in lines 50 through 61. Line 50 loads the pointer to FROMOFF% into the BX register, as was done for DIRECTION% in line 44. Remember that the BX register is being used for temporary storage and, since it is no longer needed to point to DIRECTION%, it can now be reused. Using the BX register as a pointer to the actual data, line 51 loads the value of FROMOFF% into the Source Index (SI) register. The method used in these lines (loading the pointer to the data into BX, then using BX as a pointer to load the data into the desired register) is repeated for each register that needs loading (ES, DI, CX, and DS). The two PUSH instructions, one in line 53 and the other in line 60, preserve the ES and DS registers so that the values can be restored to the original values that were passed from BASIC. You may have noticed that with the exception of the DS register the registers were loaded in the same order as the associated variables in the BASIC CALL statement. The order is actually arbitrary except for the loading of the DS register. This register is used by the other MOV instructions to point to the data segment containing the BASIC variables. Changing the DS register too soon causes the 8088 to lose track of BASIC's data segment and load invalid data.

And now the moment you've been waiting for: the actual block move instruction. When line 63 is executed, COUNT% (CX register) number of bytes starting at the address pointed to by FROMSEG% and FROMOFF%

(DS and SI registers) is moved to an area pointed to by TOSEG% and TOOFF% (ES and DI registers). If the direction chosen is forward, the addresses are incremented by one each time a byte is moved; otherwise the addresses are decremented by one. You can get a feel for the power of the REP MOVSB instruction by looking at all the instructions required to move the few bytes necessary to set up for the block move and knowing that as many as 64K bytes (the capacity of the CX register) can be moved with this one line of code.

Clean It Up

We're in the home stretch now. Before exiting back to BASIC, BMOVE has to comply with what I call Roddenberry's Rule of Order (also known as the Noninterference Directive), which states that a program will not interfere with the normal execution of another program. The BASIC manual dictates that if the contents of any of the segment or SP registers are altered during the execution of the subroutine, the original value or values must be restored before the subroutine is completed. The sample program also restores the BP register. This process isn't specifically required but doesn't hurt. The values in the affected registers were saved by the earlier PUSH instructions (lines 40, 53, and 60), which preserved the original values of the BP, ES, and DS registers. The original values are restored by the POP instructions in lines 69 through 71. Notice that the order of the POP instructions is opposite that of the PUSH instructions. The 8088 uses a last-in, first-out (LIFO) stack—the last register PUSHed must be the first register POPped.

At this point the only item remaining to be restored is the condition of the stack. Remember that the pointers to the variables were passed to BMOVE by PUSHing them onto the stack. BMOVE must remove the pointers to free up the space on the stack; otherwise the stack would grow unnecessarily each time BMOVE is invoked. The 8088 makes the clean-up task easy by allowing a certain number of bytes on the stack to be discarded after accessing the return vector. Since the pointers take up 2 bytes each, the number of bytes to skip is equal to twice the number of arguments passed to the subroutine. The Return (RET) instruction in line 73 notifies the 8088 to discard the proper number of bytes (2*NUM_ARG) and returns control to BASIC.

The remaining lines are housekeeping. Line 75 indicates the end of the procedure, line 77 marks the end of the code segment, and finally, line 79 ends the assembly language code.

BMOVE Applications

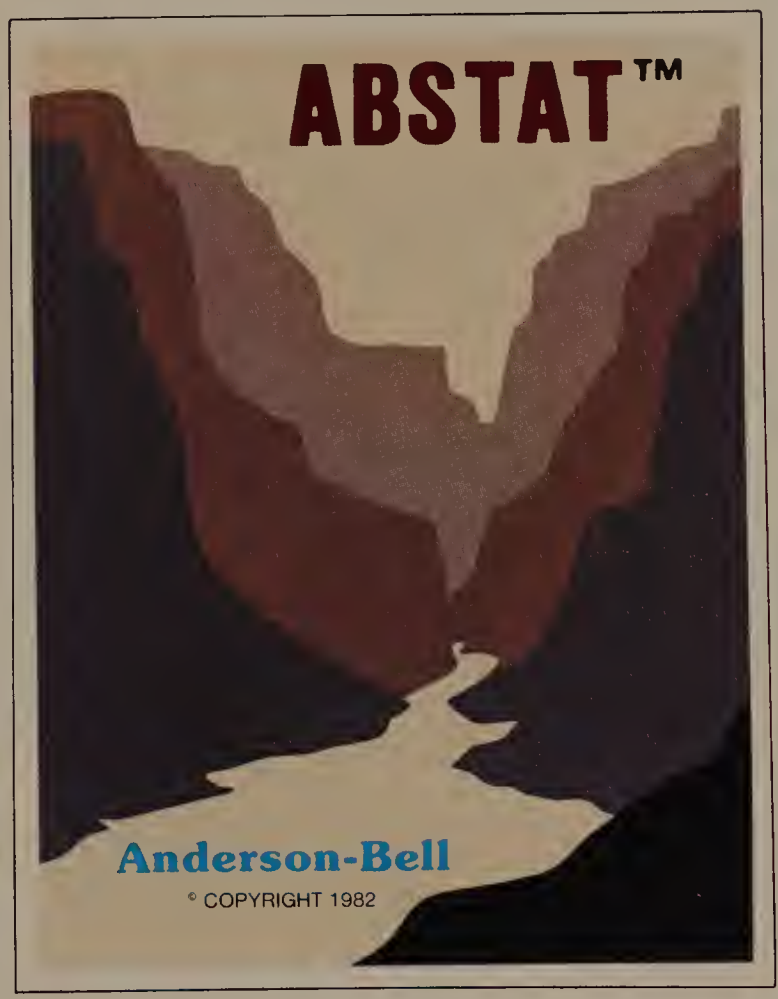
As you will see, it isn't necessary to know what each and every byte of BMOVE does in order to make use of it. You may wish to treat BMOVE as a black box and simply learn how to set up the necessary variables and issue the CALL instruction in BASIC.

Listing 2 has two subroutines. The first one (starting at line 50000) uses a technique known as string packing to load BMOVE into memory as a BASIC string (BM.PGM$). String packing eliminates the need to reserve extra memory outside BASIC, which can be difficult if you have a limited amount of memory available.

```
50000 ' Subroutine Name = BMOVE     Length = 48
50001 '
50002 ' Data Statements and Load Routine
50003 DATA &H55,&H8B,&HEC,&HFC,&H8B,&H5E,&H06,&H83,&H3F,&H00,&H74,&H01,&HFD
50004 DATA &H8B,&H5E,&H0E,&H8B,&H37,&H8B,&H5E,&H0C,&H06,&H8E,&H07,&H8B,&H5E
50005 DATA &H0A,&H8B,&H3F,&H8B,&H5E,&H08,&H8B,&H0F,&H8B,&H5E,&H10,&H1E,&H8E
50007 DATA &H1F,&HF3,&HA4,&H1F,&H07,&H5D,&HCA,&H0C,&H00
50008 RESTORE 50003
50009 BM.PGM$=STRING$(48,32)
50010 FOR X.X=1 TO 48
50011   READ X.A:MID$(BM.PGM$,X.X,1)=CHR$(X.A)
50012 NEXT X.X
50013 DEF SEG:BM.STRING=VARPTR(BM.PGM$)
50014 BM.ENTRY=PEEK(BM.STRING+1)+PEEK(BM.STRING+2)*256
50015 ' Initialize Parameters. . .
50016 BM.FROMSEG%=0:BM.FROMOFF%=0:BM.TOSEG%=0:BM.TOOFF%=0:BM.COUNT%=0:
      BM.DIRECTION%=0
50017 RETURN
50020 ' GOSUB 50020 to Execute CALL. . .
50021 DEF SEG:CALL BM.ENTRY(BM.FROMSEG%,BM.FROMOFF%,BM.TOSEG%,BM.TOOFF%,
      BM.COUNT%,BM.DIRECTION%)
50022 RETURN
```

Listing 2

Statistical analysis on the IBM-PC is not only easier and faster with ABSTAT but you can even use it with your dBase II files.



If you are using dBase II for accounting, inventory control, marketing or scientific applications, ABSTAT provides you with the ability to perform statistical data analysis with ease!

If you are not using dBase II, that's OK, because ABSTAT is a stand-alone package that can share data with other software through ASCII files.

ABSTAT facilities include full data manipulation and editing, on line help and comprehensive statistical procedures, including analysis of variance, cross tabulation, multiple regression, Z scores and much more.

ABSOLUTELY the most flexible, simple yet comprehensive statistics and data analysis package available for the IBM-PC.

Anderson - Bell
P.O. Box 191, Canon City, CO. 81212 (303) 275-1661

SEE YOUR DEALER FOR A DEMONSTRATION AND ASK ABOUT OUR 30 DAY MONEY BACK GUARANTEE

ABSTAT is a trademark of **Anderson - Bell** ● CP/M is a trademark of Digital Research ● dBase II is a trademark of Ashton Tate

Hands On

As you can see, several variables are set in this routine. Notice that the variables directly related to BMOVE all use the prefix BM. The prefix is used to avoid conflict with other variables in the main BASIC program, allowing BMOVE to be used in an existing program by simply inserting the code in Listing 2 without the fear of inserting problems along with it.

BASIC's VARPTR function is used to find the location of the string descriptor for BM.PGM$, and PEEKs are used to obtain the offset address of BM.PGM$ within BASIC's data segment. This value is assigned to BM.ENTRY% and is the entry address of BMOVE. The second subroutine (starting on line 50020) performs an actual CALL to BMOVE using a standard set of variables as parameters. To use BMOVE you must execute a GOSUB to line 50000 early in your main program, set up the parameter variables, and execute a GOSUB to 50020.

Type in the routines in Listing 2 and save them with the ASCII option (`SAVE"BMOVE.SUB",A`) so you can merge them back in later.

Listing 3 has three sample routines. They all operate on integer arrays and perform functions that you may have already written into BASIC programs. The first sample program involves initializing a 1001 element array (elements 0 through 1000) to a constant value. Both the traditional BASIC code and the BMOVE equivalent are demonstrated here to show the difference in execution speed. Figure 1 shows how an element may be propagated throughout an entire array by using BMOVE in a forward direction with overlapping data.

The second sample program allows an element to be inserted into an array at a specified point. The elements from this point to the bottom are moved down to make way for the newcomer, and the last element's value is discarded. Among the uses of this technique is the insertion sort in which each value is added to the array by moving down all elements containing a higher value and inserting the new value in its proper place.

The third sample program eliminates an element by moving all the following elements up and overlaying the departing element. After the elements are moved up, the last element will be duplicated into the next-to-last element. If this side-effect is a problem, a new value for the last element will have to be assigned manually. Figures 2 and 3 show how data-block overlap and movement direction are used to shift memory forward or backward as was done in these two sample programs.

One way to combine all these techniques is to use the technique in Demo #1 (see Listing 3) to initialize an array to a special value and add values in ascending order using the technique in Demo #2. If you want to delete a value in the middle, you can use the technique in

We Interrupt This Interrupt

Hartley G. Lesser

The speed and power of assembly language need not be beyond the grasp of BASIC aficionados, as Stuart Greenberg proves in this article. For people whose acquaintance with assembly language is somewhat limited, an explanation of a few primary elements will be helpful.

Any discussion of assembly language programming will make constant reference to a *register*, an internal memory location that stores a given value. Think of a register as unaddressed specialized memory that assists your computer in handling arithmetic efficiently.

Another word common to assembly language programming is *offset*. The PC's 8088 microprocessor can address any of 1,048,576 bytes (1 megabyte). This enormous address range is approximately 16 times greater than the address range available in an 8-bit microprocessor, such as the 8080, which uses two 8-bit bytes to address 65,536 (2^{16}) bytes. How does the 8088 address its much larger range? Its data and address registers, as well as the Instruction Pointer register, are only 16 bits wide, but to address 1,048,576 bytes, 20 bits are needed (2^{20} = 1,048,576).

The 8088 uses an offset to achieve the enlarged range. It creates a 20-bit address in the segment register that allows the greater range.

To understand this concept, we have to think in binary terms. When a binary number is displaced, or moved, one position to the left, the binary number has actually been multiplied by a factor of 2 (0000 0001 = 1, offset 1 changes value to 0000 0010 = 2). Two moves, or offsets, to the left produce a multiplication of 4 (0000 0010 becomes 0000 0100 = 4), three offsets mean a multiplication of 8 (0000 0100 becomes 0000 1000 = 8), and four mean a multiplication of 16 (0001 0000). This 4-bit offset, or binary multiplication, produces a 20-bit address in the segment register.

Let's try to visualize this technique employed by the 8088. First, we have a 16-bit value as the offset address:

```
15_____________0
¦_____________¦ OFFSET ADDRESS
```

The segment register's 16-bit value is offset four positions to the left by adding four zeros. This creates a 20-bit value in the segment address:

```
15_____________0
¦ SEGMENT REGISTER ¦ 0000¦ SEGMENT ADDRESS
```

The values in the offset address and the segment address are then added together, producing the 20-bit effective address where the 8088 goes to work:

```
19_____________0
¦_____________¦ PHYSICAL ADDRESS
```

As you can see, the actual address for the operation is the value in the offset address plus the value in the segment register times 16, which is obtained by a four-position offset to the left. The "Sample Physical Address Calculation" provides a further illustration, giving some values for these addresses so you can see the final result. A number followed immediately by an *H* indicates that the number is in hexadecimal notation.

Assembly language uses four 16-bit registers (AX, BX, CX, and DX); each may be divided into two 8-bit registers that use either the H(igh) or L(ow) part of the 16-bit register X (AH, AL, BH, BL, CH, CL, DH, and DL). These register relationships are demonstrated better in the following example. An entry of the hex value DEFG into the AX register is the same as inputting DE into the AH and FG into the AL registers. These registers all play vital roles in general programming but serve some specific purposes as well.

AX, for example, is known as the Accumulator. Input/output operations, some string operations, and word-sized (16-bit) multiplication and division are handled here. The Base register (BX) addresses data in memory, while the Count register (CX) counts loop iterations and repetitive string operations. Only data registers can be referenced as either 8- or 16-bit.

The responsibility of the four segment registers is to keep programs and data in separate memory areas. Without the segments, you'd be limited

(continues)

to 64K of data and 64K of program code. By manipulating these segments through program control, you can access up to 1024K of data. Each segment holds up to 64K and segments can overlap, especially in systems with no more than 64K of memory. When these segment registers are changed, any location can be addressed by the 8088.

The Code Segment register (CS) points to the memory area for the program currently being executed. The Stack Segment register (SS) points to a memory location that is being used temporarily for data and address storage. Your computer can stack different sets of information and still maintain the data's integrity. The Stack Pointer register (SP) points to the top of this stack. The IBM PC uses a last-in, first-out (LIFO) protocol. When a record of what is being worked on must be stored due to an interrupt, the current program address is PUSHed onto the stack. When the interrupt routine is finished, the working storage (your current program) is POPped off the stack. Proper sequencing is maintained by the stack, keeping your old work safe so that new work can be initiated. Program variables are usually held in the Data Segment register (DS), the segment upon which operations are currently being performed. The Extra Segment register (ES) is used in string operations and offers extra addressing capacity.

Pointer and index registers form the final group of the 8088's internal registers. They combine the segment register's base address with an offset in another register. The Base Pointer register (BP) or SP register give the offset, while the 8088 gets the base address from the SS register. If it's a data segment, then the offset is retrieved from the BX register or one of the index registers, Source Index (SI) or Destination Index (DI).

In most systems an instruction is retrieved from a memory location and then operated upon; following this, the instruction in the next memory location is retrieved and operated upon, and so forth. As each instruction has to be fetched before the instructions are obeyed, there is a delay. Not so with the 8088. Instruction fetching and execution are separate functional units. While the execution unit (EU) is executing an instruction, the bus interface unit (BIU) is already retrieving the next instruction. The Instruction Pointer register (IP) is the next-fetch-address register, because it contains the offset of the next instruction to be acted upon by the EU.

Once you understand segment registers, the pseudo-op (pseudo-operation) ASSUME is fairly simple to understand. A pseudo-op is an instruction to an assembler, not the microprocessor, to perform a specific task. ASSUME tells the assembler exactly what segment a segment register belongs to. NEAR and FAR are pseudo-op distance attributes. A FAR procedure has the ability to be called from any segment. A NEAR procedure can only be called into play from the program within the segment that defined it. And what is a procedure? It is a group of instructions that are executed from various program locations. Each procedure is written only once so that programs can be shorter.

Flags report status conditions after an instruction has been completed. The flag register has nine flags, each of which operates differently. For example, the Carry Flag (CF) acts as a result indicator for multiplication. If the CF equals 1, then a carry has been produced by an add operation (or a borrow has been produced by a subtraction). The Parity Flag (PF) is used mainly in data communications applications, while the Auxiliary Carry Flag (AF) operates on "packed" decimal numbers. A packed decimal byte can hold the numbers 00 to 99. The Zero Flag (ZF) is equal to 1 if a zero results from an operation, and the Sign Flag (SF) is used only when operations are performed on signed numbers, as it mirrors the most significant bit of the operation's result. The Trap Flag (TF) is used for debugging, and the Interrupt Enable Flag (IF) allows external devices to request system recognition. Index registers are increased (in the forward direction) or decreased (in the backward direction) according to the status of the Direction Flag (DF). The Overflow Flag (OF) indicates errors during signed number operations.

This brief explanation will hopefully increase your understanding of the programming possibilities presented in this article. BASIC need not be basic any longer.

Sample Physical Address Calculation

```
Offset address  = 12H          0000 0000 0001 0010 (16-bit)
Segment address = 4000H + 0100 0000 0000 0000 0000 (20-bit)
Physical address = 4012H       0100 0000 0000 0001 0010 (20-bit)
```

```
1 ' MOVARRAY.DEM - Demonstration program for the BMOVE Subroutine
2 '
3 '                Written by: Stuart Greenberg
4 '                Copyright May, 1983 - May not be copied for commercial
5 '                use
10 DEF SEG=0:BASIC.SEG%=PEEK(&H510)+PEEK(&H511)*256:BASIC.TOP%=BASIC.
   SEG%+&H1000
20 ' Set-up BMOVE Routine
30 GOSUB 50000
40 CLS:KEY OFF
100 ' The following three routines (1000, 2000, 3000) perform
110 ' demonstrations of the BMOVE subroutine. In each case
120 ' parameter variables are assigned appropriate values
130 ' and a GOSUB to 50020 is executed. The parameter
140 ' variables are:
150 '       FROMSEG% - The segment address of the source block
160 '       FROMOFF% - The offset address of the source block
170 '       TOSEG%   - The segment address of the destination block
180 '       TOOFF%   - The offset address of the destination block
185 '       COUNT%   - The number of bytes to move (1 integer=2 bytes)
190 '       DIRECTION% - 0=Forward, Any other value=Backward
200 '
210 '=============================================================
220 '
1000 ' DEMO #1 - This demo will load an integer array containing 1001
          elements using the FOR/NEXT method and then the BMOVE
1010 '    subroutine. The FOR/NEXT loop will load the array with
1020 '    zeroes and BMOVE will reassign each element the value
1030 '    1983. After hitting the space bar the array is
1040 '    displayed to show that all elements really and truly
1050 '    contain 1983.
1060 '
1065 PRINT "D E M O   # 1"
1070 DIM A%(1000)                                   'Define array
1075 PRINT TAB(25);"--START-";TAB(40);"---END--"
1080 PRINT "FOR/NEXT loop: ";TAB(25);TIME$;
1090 FOR X%=0 TO 1000                               'FOR/NEXT loop
1100   A%(X%)=0                                     '  assigns 0 to
1110 NEXT                                           '  each element
1120 '
1130 PRINT TAB(40);TIME$:PRINT "BMOVE:";TAB(25);TIME$;
1140 A%(0)=1983                                     'First element=1983
1150 BM.FROMSEG%=BASIC.SEG%:BM.TOSEG%=BASIC.SEG% 'From & to segments
1155 '                                               are Basic's work area
1160 DEF SEG                                        'Set segment for VARPTR
1170 BM.FROMOFF%=VARPTR(A%(0))                      'Address of 1st element
1180 BM.TOOFF%=BM.FROMOFF%+2                        'Address of 2nd element
1190 BM.COUNT%=2000                                 '2000 bytes to move
1200 BM.DIRECTION%=0                                'Forward direction
1210 GOSUB 50020                                    'Invoke BMOVE
1220 PRINT TAB(40);TIME$
1230 '
1240 GOSUB 45000
1255 LOCATE 25,1:PRINT SPACE$(79);:LOCATE 4,1
1257 PRINT:PRINT:PRINT "--ARRAY VERIFICATION--"        'Verify entire array
1260 FOR X%=0 TO 5
1270   PRINT USING "Element ####    = ####";X%,A%(X%)  'First 5 visually
1280 NEXT
```

(continues)

Listing 3

```
1290 PRINT STRING$(22,249)
1300 FOR X%=6 TO 995
1310   LOCATE CSRLIN,1                                    'Middle 990 visually
1320   IF A%(X%)<>1983 THEN STOP                          'and use IF
1330   PRINT USING "Element 6 - ### = ####";X%,A%(X%);    'statement since
1340 NEXT                                                 'this goes by too
1350 PRINT:PRINT STRING$(22,249)                          'fast
1360 FOR X%=996 TO 1000
1370   PRINT USING "Element    #### = ####";X%,A%(X%)     'Last 5 visually
1380 NEXT
1390 ' E N D   O F   D E M O   # 1
1400 '
1410 '=============================================================================
1420 '
2000 ' DEMO #2 - This demo will move the lower part of an array down to
2010 '    make room for a value to be inserted in the middle. Elements 31
2020 '    thru 99 will move to 32 thru 100 and a new value will be assigned
2030 '    to element 31. This method can be the basis of an insertion
2040 '    sort where each element is checked against a new value and
2050 '    inserted in its proper place.
2060 '
2062 GOSUB 45000
2065 CLS:PRINT "D E M O   # 2"
2067 PRINT "Before:"
2070 DIM B%(100)                                          'Define array
2080 FOR X%=0 TO 100                                      'Initialize to
2090   B%(X%)=X%                                          '  sequential values
2095   PRINT B%(X%),                                      '  AND PRINT THEM
2100 NEXT
2110 '
2120 BM.FROMSEG%=BASIC.SEG%:BM.TOSEG%=BASIC.SEG%          'From & to segments
2130 '                                                     are Basic's work area
2140 DEF SEG                                              'Set segment for VARPTR
2150 BM.FROMOFF%=VARPTR(B%(99))+1                         'Address of element 99
2160 BM.TOOFF%=BM.FROMOFF%+2                              'Address of element 100
2170 BM.COUNT%=138                                        'Byte count=2*elements
2180 BM.DIRECTION%=1                                      'Backward direction
2190 GOSUB 50020                                          'Invoke BMOVE
2200 B%(31)=1983                                          'Set element 31
2202 GOSUB 45000
2205 LOCATE 2,1:COLOR 15,0:PRINT "After: "
2210 FOR X%=0 TO 100                                       'Reprint array showing
2220   PRINT B%(X%),                                       '  new values
2230 NEXT
2240 ' E N D   O F   D E M O   # 2
2250 '
2260 '=============================================================================
2270 '
3000 ' DEMO #3 - This demo will move the lower part of an array up to
3010 '    delete an element form the middle. Elements 32 thru 100 will
3020 '    move up to 31 thru 99 thus deleting element 31.
3060 '
3070 GOSUB 45000                                           'Wait to continue
3080 LOCATE 1,1:COLOR 7,0:PRINT "D E M O   # 3"
3090 PRINT "Before:"
```

Listing 3 *(continued)*

```
3100 FOR X%=0 TO 100                                    'Reprint array showing
3110   PRINT B%(X%),                                    '  starting values
3115 NEXT
3120 BM.FROMSEG%=BASIC.SEG%:BM.TOSEG%=BASIC.SEG%        'From & to segments
3130 '                                                   are Basic's work area
3140 DEF SEG                                            'Set segment for VARPTR
3150 BM.FROMOFF%=VARPTR(B%(32))                         'Address of element 32
3160 BM.TOOFF%=BM.FROMOFF%-2                            'Address of element 31
3170 BM.COUNT%=138                                      'Byte count=2*elements
3180 BM.DIRECTION%=0                                    'Forward direction
3190 GOSUB 50020                                        'Invoke BMOVE
3192 GOSUB 45000
3195 LOCATE 2,1:COLOR 15,0:PRINT "After: "
3210 FOR X%=0 TO 100                                    'Reprint array showing
3220   PRINT B%(X%),                                    '  new values
3230 NEXT
3240 COLOR 7,0
3250 '
3260 ' E N D   O F   D E M O   # 3
3270 '
3280 '=============================================================================
4000 GOSUB 45000                                         'Wait to continue
4010 CLS:PRINT "E N D   O F   D E M O S"                 'End of Demo routines
4020 END
45000 LOCATE 25,1:COLOR 23,0:PRINT TAB(28);"Hit Space Bar to Continue"
      ;:COLOR 7,0
45001 A$=INKEY$:IF A$<>" " THEN 45001
45002 LOCATE 25,1:PRINT SPACE$(79);:LOCATE 4,1:RETURN
50000 ' Subroutine Name = BMOVE     Length = 48
50001 '
50002 ' Data Statements and Load Routine
50003 DATA &H55,&H8B,&HEC,&HFC,&H8B,&H5E,&H06,&H83,&H3F,&H00,
      &H74,&H01,&HFD
50004 DATA &H8B,&H5E,&H0E,&H8B,&H37,&H8B,&H5E,&H0C,&H06,&H8E,
      &H07,&H8B,&H5E
50005 DATA &H0A,&H8B,&H3F,&H8B,&H5E,&H08,&H8B,&H0F,&H8B,&H5E,
      &H10,&H1E,&H8E
50007 DATA &H1F,&HF3,&HA4,&H1F,&H07,&H5D,&HCA,&H0C,&H00
50008 RESTORE 50003:DEF SEG
50009 BM.PGM$=STRING$(48,32)
50010 FOR X.X=1 TO 48
50011   READ X.A:MID$(BM.PGM$,X.X,1)=CHR$(X.A)
50012 NEXT X.X
50013 BM.STRING=VARPTR(BM.PGM$)
50014 BM.ENTRY=PEEK(BM.STRING+1)+PEEK(BM.STRING+2)*256
50015 ' Initialize Parameters. . .
50016 BM.FROMSEG%=0:BM.FROMOFF%=0:BM.TOSEG%=0:BM.TOOFF%=0:BM.COUNT%=0:BM.
      DIRECTION%=0
50017 RETURN
50020 ' GOSUB 50020 to Execute CALL. . .
50021 DEF SEG:CALL BM.ENTRY(BM.FROMSEG%,BM.FROMOFF%,BM.TOSEG%,BM.TOOFF%,BM.
      COUNT%,BM.DIRECTION%)
50022 RETURN
64000 SAVE"movarray.dem"
```

Hands On

Demo #3 and set the last element equal to the special value to indicate that the array is not full. The existence of the special value in the last element assures you that the array has not filled up and that insertion of another value will not cause a loss of data. The array always contains the values in sorted order followed by elements set to the special value.

Before executing the sample routines in the program MOVARRAY.DEM, examine some of the code in Listing 3. Line 10 PEEKs locations 0510H and 0511H to obtain the segment address of the start of BASIC's work space (see the IBM *Personal Computer Technical Reference* manual, page 3-22), assigns the value to the variable BASIC.SEG%, adds 1000H to BASIC.SEG% to determine the top of BASIC's work space, and assigns this value to BASIC.TOP%. BASIC.SEG% is needed when an assembly language subroutine needs to access data within BASIC's work space. In Demo #1, for example, the array A%. BASIC.TOP% contains the next available segment above BASIC's 64K work space and can be used to indicate the start of a safe haven for code or data to be stored outside BASIC's influence. This assumes a full 64K BASIC work space. If you have less than 96K of memory or you have high memory reserved for a RAM disk or spooler, you will have to change this value manually. The steps required to make this manual setting are beyond the scope of this article but are described in the BASIC manual.

In the course of writing these sample routines, the desirability of a subroutine to halt execution and wait for an operator request to continue became obvious. The subroutine was added starting at line 45000. When invoked via a GOSUB 45000, it will display a flashing message, wait for the operator to hit the space bar, and continue processing. This subroutine saved a considerable amount of coding that would have been required had the routine been typed in each time it was needed.

Type in the code for the sample program MOVARRAY.DEM, and if it isn't already present, merge in the BMOVE subroutine you saved earlier. Save the entire program to disk with the command `SAVE"MOVARRAY.DEM"` , and when you type RUN the first demo will start. You will notice that the BMOVE routine runs significantly faster than the FOR...NEXT loop.

By the way, if you don't believe that all the elements have been set to 1983, just press the space bar. The entire

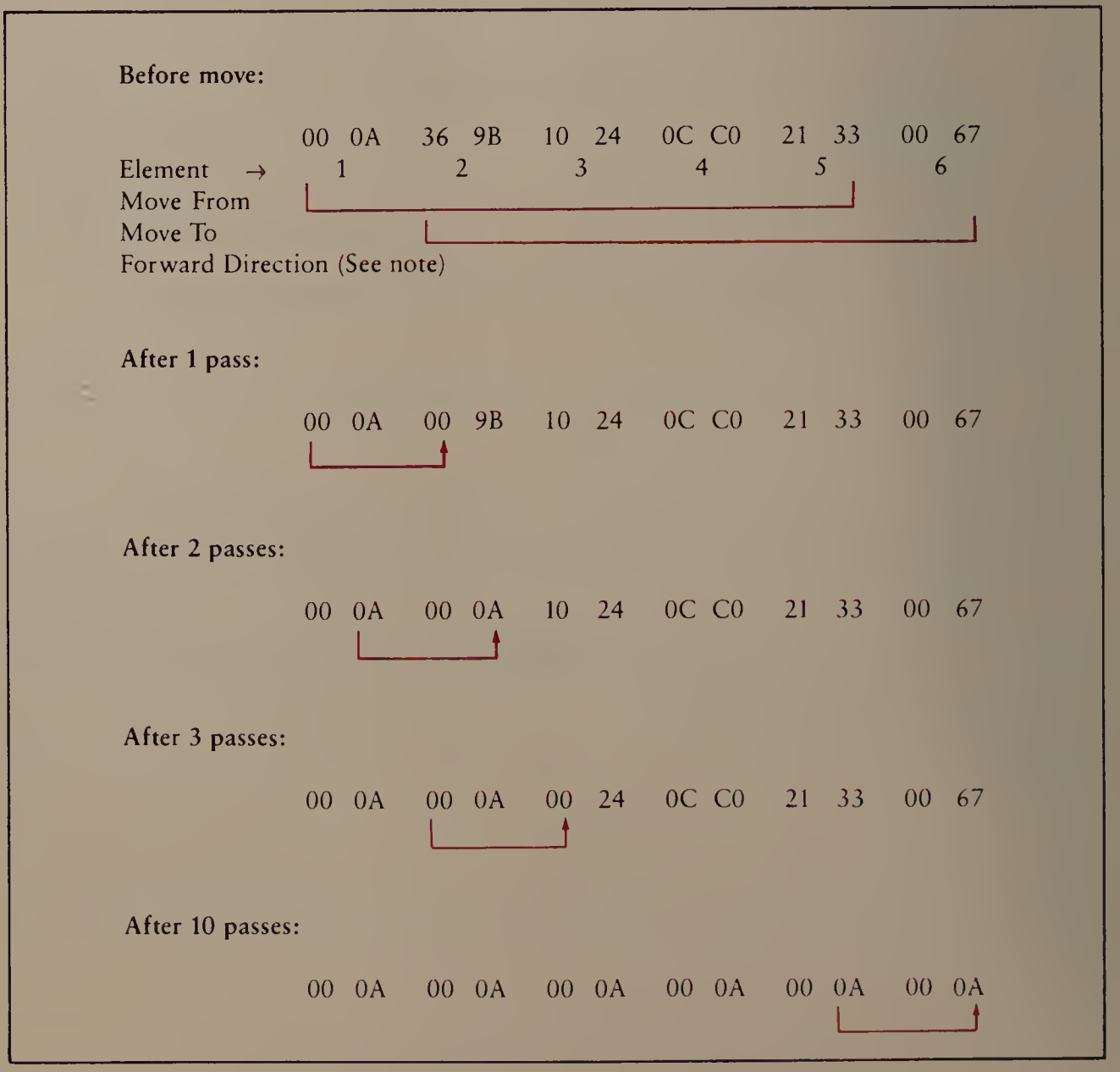


Figure 1: From address < to address, forward direction. Element 1 is copied into 2 through 6.

array will be displayed on the screen and each element will be equal to 1983. Continue through the demonstration routines by pressing the space bar when requested, and note the effect on the array after Demos #2 and #3. They used a small array (101 elements) for easy viewing since the speed of BMOVE was already demonstrated in Demo #1. If you need to be convinced of the true speed advantage of the BMOVE routine, change the DIMensions and BMOVE parameters to use a larger array for each demo. A 5001 element array will take approximately 30 seconds to initialize using FOR...NEXT, but it will be instantaneous using BMOVE. You'll find BMOVE a valuable tool as you experiment with BMOVEing pieces of arrays.

Hold That Screen

Listing 4 is another subroutine called Screen Slinger. It allows you to create screens and store them in memory. When you want to display one of the screens, just give Screen Slinger the G command and the screen is BMOVEd from memory to the display in the blink of an eye. Screen Slinger can be used to display menus and the legends for fill-in-the-blank-type data screens. It can also be used for creating animated effects by saving the individual "snap shot" of screens and "slinging" them rapidly in succession.

When you are using Screen Slinger, the main consideration is the amount of memory available above BASIC (beyond BASIC.TOP%). Each monochrome display screen requires 4K, and each color graphics display screen requires 16K. The number of screens is limited only by the amount of available memory; of course, if you have no memory available, you can't use Screen Slinger at all. Each screen is stored contiguously in memory and is accessed by its assigned screen number. Screen Slinger can also save or load a block of screens to and from the disk so that you need only create the screen once and call it into memory from disk when the target program is run. Alternatively, you could load all the screens needed for an application when you start it. That way they will remain resident even when you chain to another program.

Screen Slinger is split into two sections, each having four functions. The split is necessary because the method used to save text screens is different from that used to save graphics screens. The text screen is simply a con-

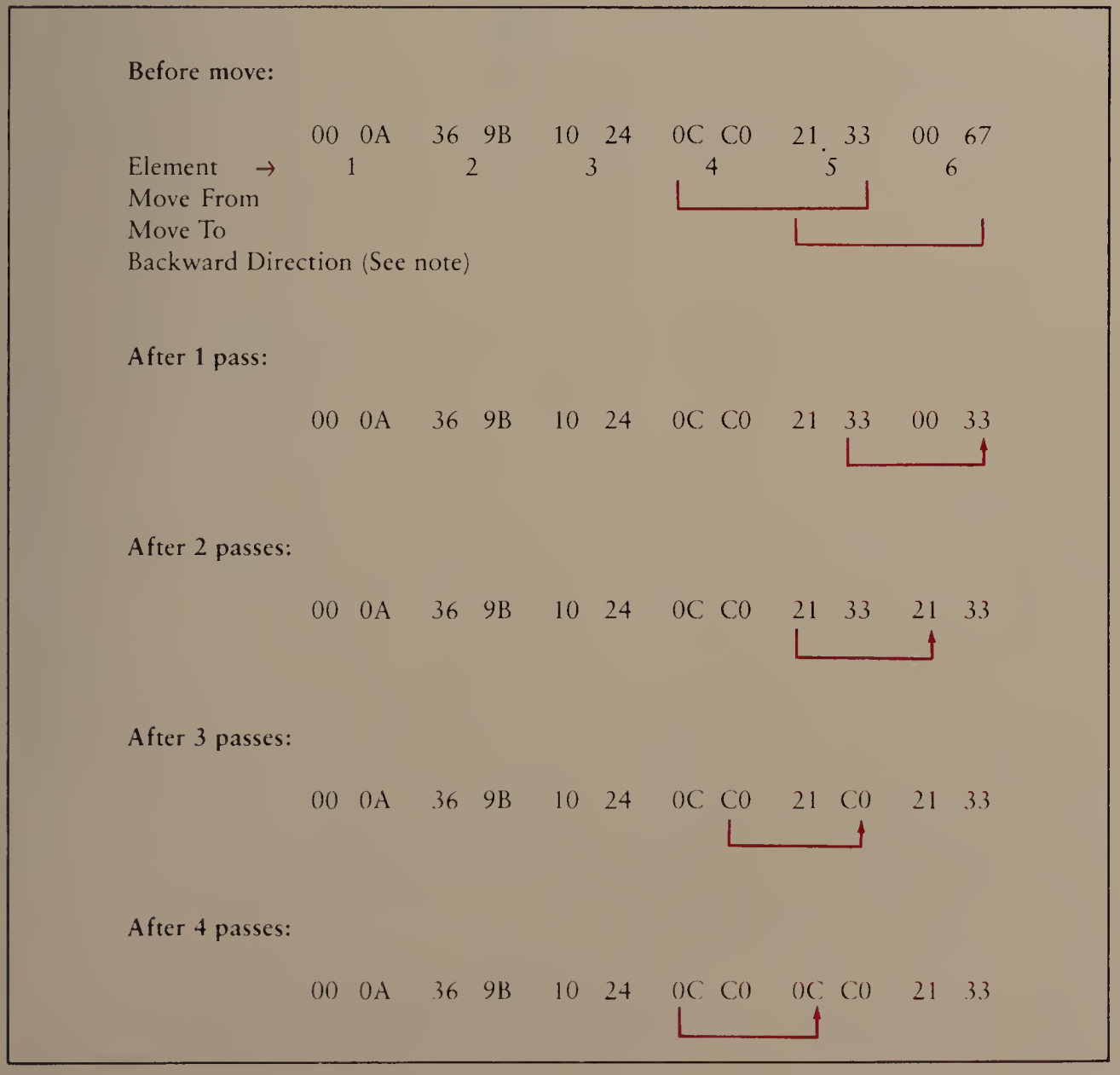


Figure 2: From address < to address, backward direction. Elements 4 and 5 move down to 5 and 6.

tiguous block of 4K bytes of memory, while the graphics screen consists of two 8K blocks. The variable SS.MODE$ contains T for text or G for graphics to allow Screen Slinger to choose the correct routine to perform the required function. The function itself is chosen by setting the variable SS.CMD$ to one of the following values:

G Gets a block of screens from disk
P Puts a block of screens to disk
S Stores a screen in memory
R Restores a screen to the display

The variable SS.SRNNUM% must contain the desired screen number for commands S and R. Since Screen Slinger uses BLOAD to get the screens from disk, it must load all the screens saved in a file at one time, but it can store any or all screens currently stored in memory. In either case, SS.SRNNUM% indicates the first screen number, and for the P command SS.COUNT% must contain the number of screens to put to disk. For commands G and P the variable SS.NAME$ must contain the name of a disk file. Finally, the variable SS.BASE% must be set to the beginning of the memory area used to store the screens.

Type in Listing 4 and save it in ASCII format using the command SAVE"SCRNSLGR",A . Now type in Listing 5. If necessary, merge the Screen Slinger subroutine back in with the command MERGE"SCRNSLGR" and save the complete program by typing SAVE"SCRNSLGR.DEM" . If you are using a color monitor, you will have to make a few changes to the demo program. The starting segment ad-

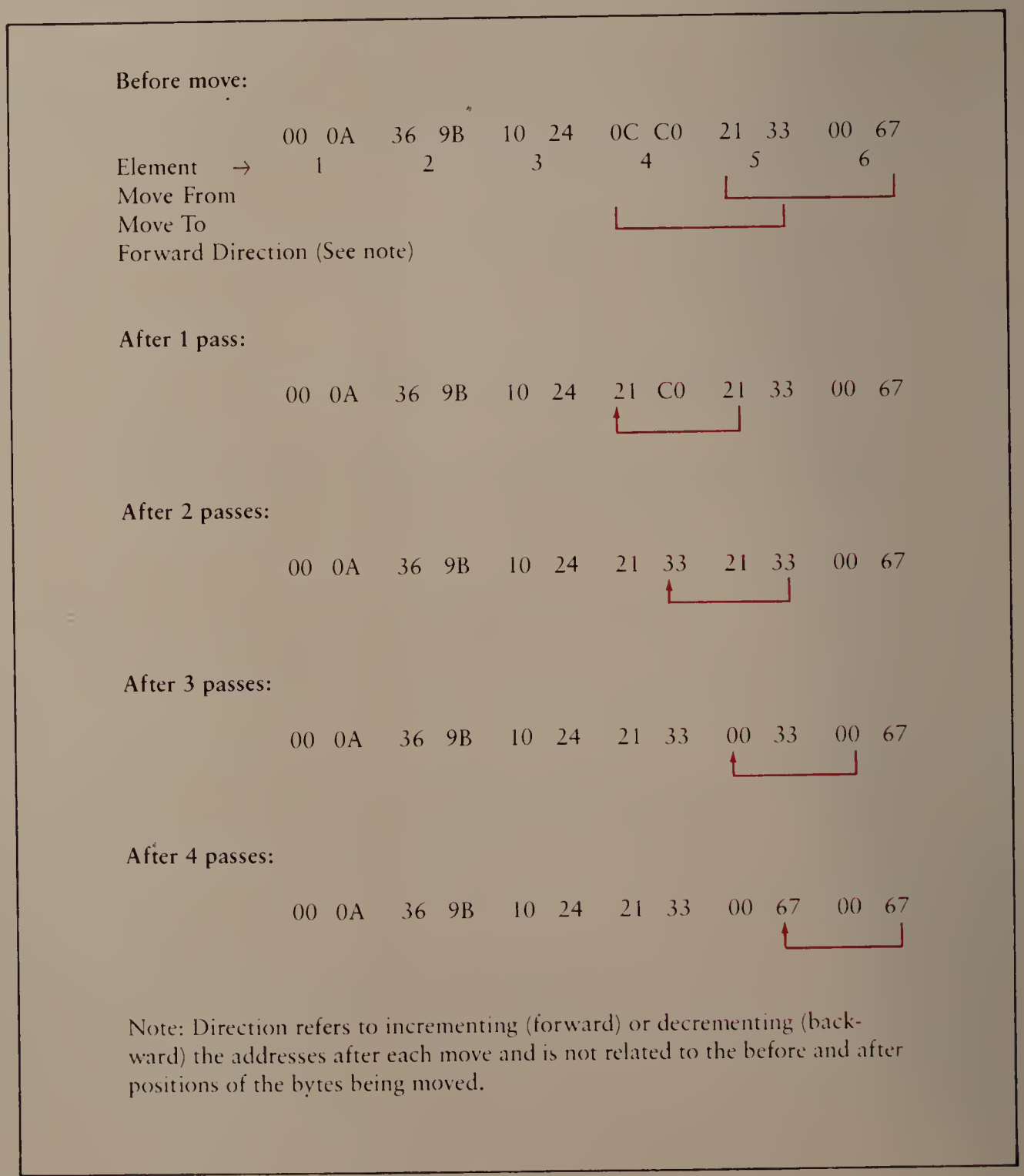


Figure 3: From address > to address, forward direction. Elements 5 and 6 move up to 4 and 5.

Please enroll me at the low introductory offer
☐ 15 issues/$24 ☐ 27 issues/$39 ☐ 39 issues/$53

☐ Bill Me ☐ Payment Enclosed

We accept MasterCard or VISA, or we can invoice you or your company. Call toll-free: 800/247-5470 (In Iowa: 800/532-1272).

All subscriptions begin with the next available issue. Please allow 6–8 weeks for delivery of your first issue. Outside the U.S., subscriptions must be prepaid in U.S. funds. For foreign surface mail add $24 per year to the subscription rates; for foreign airmail add $101 per year to the subscription rates. Allow an additional 4 weeks for delivery by foreign surface mail.

Name _____

Company _____

Address _____

City, State, Zip _____

PC WORLD

Subscription Department
P.O. Box 6700
Bergenfield, NJ 07621

J2070

NO POSTAGE
NECESSARY
IF MAILED IN
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 63 BERGENFIELD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
Subscription Department
P.O. Box 6700
Bergenfield, New Jersey 07621

```
1 ' SCRNSLGR.DEM - Demonstration program for the SCRNSLGR subroutine
2 '
3 '               Written by: Stuart Greenberg
4 '               Copyright May, 1983 - May not be copied for
5 '               commercial use!
10 DEF SEG=0:BASIC.SEG%=PEEK(&H510)+PEEK(&H511)*256:BASIC.TOP%=BASIC.
   SEG%+&H1000
20 DEF SEG=&H40:SCREENSEG%=&HB000-((PEEK(&H10) AND &H30)<>&H30)*&H800
30 KEY OFF:CLS
40 GOSUB 50000                              'Initialize BMOVE
50 '                                         Basic + 16 bytes
60 '                                         Mode of screen=text
70 SS.BASE%=BASIC.TOP%+1                    'Start of screen storage=Top of
80 '                                         Basic + 16 bytes
90 SS.MODE$="G"                             'Mode of screen=text
91 '
92 PRINT "Demonstration of Screen Slinger":PRINT
94 INPUT "Enter 1 to create screens or 2 to use saved screens: ",A
96 IF A=2 THEN INPUT "Enter filename: ",SS.NAME$:CLS:GOTO 540 ELSE CLS
98 '
100 A$=CHR$(249)+CHR$(250)+CHR$(250)
110 B$="BMOVE - The Block Move Subroutine by Stuart Greenberg"
    'Message to print
120 '
130 ' Create first screen:
140 '
150 Y=0                                              'Set border offset
160 GOSUB 1000                                       'Display border
170 SS.CMD$="S":SS.SRNNUM%=1:GOSUB 49100             'Save screen 1
180 '
190 ' Create second screen:
200 '
210 Y=2                                             'Set border offset
220 LOCATE 13,15:COLOR 15,0:PRINT B$;:COLOR 7,0 'Display msg highlighted
230 GOSUB 1000                                      'Display border
240 SS.CMD$="S":SS.SRNNUM%=2:GOSUB 49100            'Save screen 2
250 '
260 ' Create third screen:
270 '
280 Y=1                                             'Set border offset
290 LOCATE 13,15:PRINT B$;                          'Display msg normal
300 GOSUB 1000                                      'Display border
310 SS.CMD$="S":SS.SRNNUM%=3:GOSUB 49100            'Save screen 3
320 '
330 ' Display each screen in turn - repeate indefinately
340 '
350 X=1
360 SS.CMD$="R"                                     'RESTORE command
370 SS.SRNNUM%=X:GOSUB 49100                        'Each screen (X=1 to 3)
380 X=X+1:IF X>3 THEN X=1                           'Increment X
390 FOR Y=1 TO 50:NEXT Y                            'Display delay
400 IF INKEY$="" THEN 370 ELSE IF LOOP=1 THEN 630 'Check for keypress
410 '
420 ' When any key is pressed - continue:
430 '
440 COLOR 7,0                                       'Reset color
450 LOCATE 13,15:PRINT SPACE$(LEN(B$))              'Blank msg
460 LOCATE 13,15:INPUT "Enter filename for screen save: ",SS.NAME$
470 SS.SRNNUM%=1                                   'First screen number=1
480 SS.SRNCNT%=3                                   'Number of screens to save=3
```

(continues)

Listing 4

```
490 SS.CMD$="P"                                    'PUT command
500 GOSUB 49100                                    'Save screens
510 '
520 ' Now to reload screens:
530 '
540 LOCATE 13,15:PRINT SPACE$(LEN(B$))             'Blank msg
550 LOCATE 13,15:PRINT "Reloading screens from: ";SS.NAME$;
560 SS.SRNNUM%=1                                   'First screen number
570 SS.CMD$="G"                                    'GET command
580 GOSUB 49100                                    'Reload screens
590 LOOP=1
600 GOTO 350                                       'Redisplay screens
610 '
620 ' End of demo message
630 CLS:PRINT "End of demonstration":END           'End of Demo routine
640 '
650 ' End of mainline code
1000 '
1010 ' Display boarder subroutine:
1020 '
1030 ' Top:
1040 '
1050 FOR X=1 TO 79
1060   Y=Y+1:IF Y>3 THEN Y=1
1070   IF Y=1 THEN COLOR 15,0 ELSE COLOR 7,0
1080   LOCATE 1,X:PRINT MID$(A$,Y,1);
1090 NEXT X
1100 '
1110 ' Right side:
1120 '
1130 FOR X=2 TO 24
1140   Y=Y+1:IF Y>3 THEN Y=1
1150   IF Y=1 THEN COLOR 15,0 ELSE COLOR 7,0
1160   LOCATE X,79:PRINT MID$(A$,Y,1);
1170 NEXT X
1180 '
1190 ' Bottom:
1200 '
1210 FOR X=79 TO 1 STEP -1
1220   Y=Y+1:IF Y>3 THEN Y=1
1230   IF Y=1 THEN COLOR 15,0 ELSE COLOR 7,0
1240   LOCATE 25,X:PRINT MID$(A$,Y,1);
```

Listing 4 *(continued)*

```
49101 IF SS.MODE$="G" THEN 49110
49102 'Text Display:
49103 ON INSTR("SRPG",SS.CMD$) GOTO 49104,49105,49106,49107:RETURN
49104 BM.FROMSEG%=SCREENSEG%:BM.FROMOFF%=0:BM.TOSEG%=SS.BASE%:BM.
      TOOFF%=4096*(SS.SRNNUM-1):BM.COUNT%=4096:GOSUB 50020:RETURN
49105 BM.FROMSEG%=SS.BASE%:BM.FROMOFF%=4096*(SS.SRNNUM-1):BM.
      TOSEG%=SCREENSEG%:BM.TOOFF%=0:BM.COUNT%=4096:GOSUB 50020:RETURN
49106 DEF SEG=SS.BASE:BSAVE SS.NAME$,4096*(SS.SRNNUM-1),4096*SS.
      SRNCNT:RETURN
49107 DEF SEG=SS.BASE:BLOAD SS.NAME$,4096*(SS.SRNNUM-1):RETURN
49108 '
49109 'Graphics Display:
49110 ON INSTR("SRPG",SS.CMD$) GOTO 49111,49113,49115,49116:RETURN
```

Listing 5

```
1250 NEXT X
1260 '
1270 ' Left side:
1280 '
1290 FOR X=24 TO 2 STEP -1
1300   Y=Y+1:IF Y>3 THEN Y=1
1310   IF Y=1 THEN COLOR 15,0 ELSE COLOR 7,0
1320   LOCATE X,1:PRINT MID$(A$,Y,1);
1330 NEXT X
1340 '
1350 RETURN
50000 ' Subroutine Name = BMOVE     Length = 48
50001 '
50002 ' Data Statements and Load Routine
50003 DATA &H55,&H8B,&HEC,&HFC,&H8B,&H5E,&H06,&H83,&H3F,&H00,
      &H74,&H01,&HFD
50004 DATA &H8B,&H5E,&H0E,&H8B,&H37,&H8B,&H5E,&H0C,&H06,&H8E,
      &H07,&H8B,&H5E
50005 DATA &H0A,&H8B,&H3F,&H8B,&H5E,&H08,&H8B,&H0F,&H8B,&H5E,
      &H10,&H1E,&H8E
50006 DATA &H1F,&HF3,&HA4,&H1F,&H07,&H5D,&HCA,&H0C,&H00
50007 DATA &H1F,&HF3,&HA4,&H1F,&H07,&H5D,&HCA,&H0C,&H00
50008 RESTORE 50003
50009 BM.PGM$=STRING$(48,32)
50010 FOR X.X=1 TO 48
50011   READ X.A:MID$(BM.PGM$,X.X,1)=CHR$(X.A)
50012 NEXT X.X
50013 DEF SEG:BM.STRING=VARPTR(BM.PGM$)
50014 BM.ENTRY=PEEK(BM.STRING+1)+PEEK(BM.STRING+2)*256
50015 ' Initialize Parameters. . .
50016 BM.FROMSEG%=0:BM.FROMOFF%=0:BM.TOSEG%=0:BM.TOOFF%=0:BM.
      COUNT%=0:BM.DIRECTION%=0
50017 RETURN
50018 DEF SEG:CALL BM.ENTRY(BM.FROMSEG%,BM.FROMOFF%,BM.TOSEG%,
      BM.TOOFF%,BM.COUNT%,BM.DIRECTION%)
50019 RETURN
50020 ' GOSUB 50020 to Execute CALL. . .
50021 DEF SEG:CALL BM.ENTRY(BM.FROMSEG%,BM.FROMOFF%,BM.TOSEG%,
      BM.TOOFF%,BM.COUNT%,BM.DIRECTION%)
50022 RETURN
64000 SAVE"scrnslgr.dem"
```

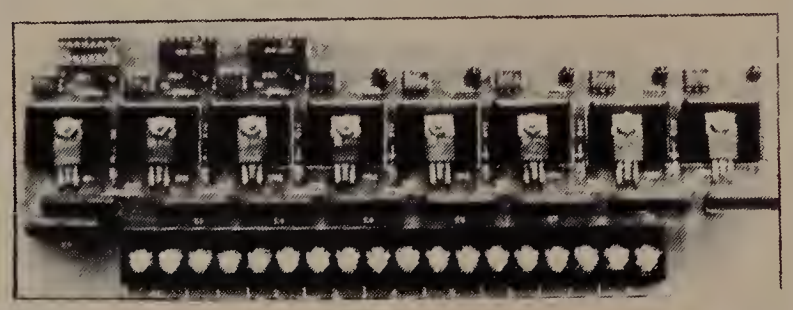
```
49111 BM.FROMSEG%=SCREENSEG%:BM.FROMOFF%=0:BM.
      TOSEG%=SS.BASE%+(SS.SRNNUM%-1)*1000:BM.
      TOOFF%=0:BM.COUNT%=8000:GOSUB 50020
49112 BM.FROMSEG%=SCREENSEG%+&H200:BM.FROMOFF%=0:BM.
      TOSEG%=SS.BASE%+(SS.SRNNUM%-1)*1000:BM.TOOFF%=8000:BM.
      COUNT%=8000:GOSUB 50020:RETURN
49113 BM.FROMSEG%=SS.BASE%+(SS.SRNNUM%-1)*1000:BM.FROMOFF%=0:BM.
      TOSEG%=SCREENSEG%:BM.TOOFF%=0:BM.COUNT%=8000:GOSUB 50020
49114 BM.FROMSEG%=SS.BASE%+(SS.SRNNUM%-1)*1000:BM.FROMOFF%=8000:BM.
      TOSEG%=SCREENSEG%+&H200:BM.TOOFF%=0:BM.
      COUNT%=8000:GOSUB 50020:RETURN
49115 DEF SEG=SS.BASE:BSAVE SS.NAME$,16000*(SS.SRNNUM-1),16000*SS.
      SRNCNT:RETURN
49116 DEF SEG=SS.BASE:BLOAD SS.NAME$,16000*(SS.SRNNUM-1):RETURN
```

PERIPHERALS FOR THE IBM PC

look for low cost–high quality interfaces for the IBM PC



UNIVERSAL I/O. The Universal I/O board has 16 eight bit analog inputs with a voltage range of 0 to 5 volts. It also has 9 eight bit parallel I/O ports. It has interrupt circuitry, Timer clock 32768 Hz. to 512 sec., prototyping area, and LED for power. Part number 83-064A **$299.95**



120 VAC CONTROL. This board has eight optically isolated triac switches. Each switch can control 200 watts. It connects via a 16 pin ribbon cable to a parallel output port. Screw terminals are provided for 120 vac connection. Part number 82-332. **$119.95.**



INPUT PROTECTOR. This board protects the inputs of the ANALOG input or PARALLEL input ports. There are 4.7K pullups, diodes and caps for each line. It connects via a 16 pin ribbon cable. Screw terminals are provided for connection. Part number 82-334. **$89.95.**

To order: Send check or money order. Add 6.5% tax in California. Add 5% shipping for orders less than $100 or 3% for orders over $100 or 10% outside U.S.A. Phone orders: We accept Visa or MC. Add $2.00 for C.O.D. Will Call Hours 9am to 4pm.

JOHN BELL ENGINEERING, INC.

1014 CENTER ST.
SAN CARLOS, CA. 94070
(415) 592-8411

Reader Service #403

dress for the screen memory will automatically be set by line 20 unless you have both color and monochrome display interfaces in your machine. If you have both, you can replace the code in line 20 to set the variable SCREENSEG% to either &HB000 for monochrome or &HB800 for color. Although the demo program is set up for text mode, you can save color graphics screens just as easily. Simply change the T in line 90 to a G and replace the screen creation code with appropriate code to create screens in either SCREEN 1 or SCREEN 2 mode. Screen Slinger will automatically manipulate the 16K graphics screen instead of the 4K text screen. Remember that the number of screens you can hold is limited to the amount of free memory above BASIC and that graphics screens take up four times as much space as text screens. You might also like to enter COLOR statements here and there to be fancy.

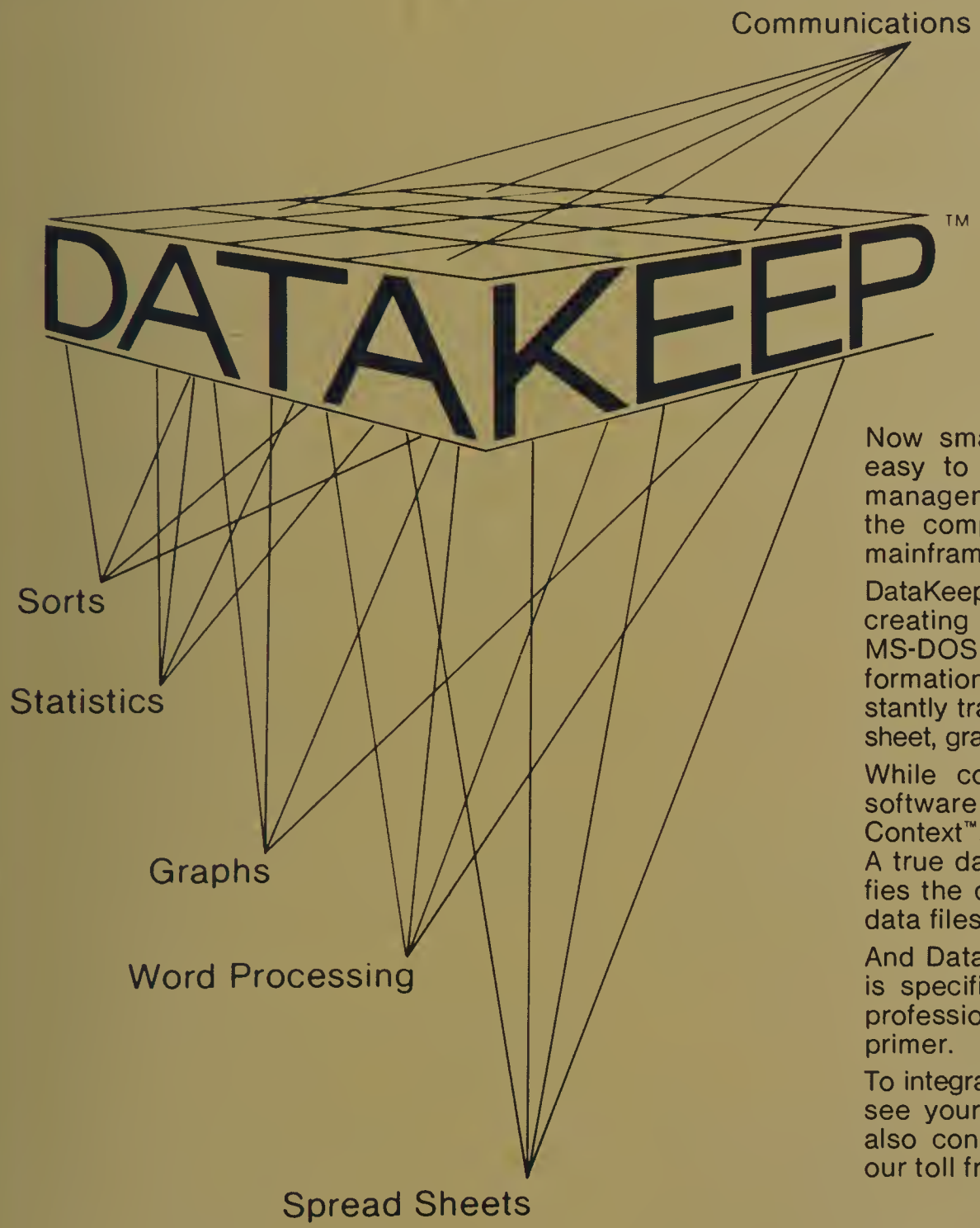
You can now run the Screen Slinger demo to create and flash a few screens around. When the program starts it will ask whether you want to create screens or restore them from a file. The first time you run the demo, choose option 1; three screens will appear. After each screen is created, it is saved in memory starting 16 bytes above the top of BASIC (BASIC.TOP% +1). I add 16 bytes as a buffer (sometimes I'm overly cautious). Notice that the saves are virtually instantaneous. When all three screens are saved, they will be flashed on the screen in rapid succession, creating an animated effect. To stop the show, press the space bar and enter a file name. The three screens will now be saved to disk, reloaded, and redisplayed. Press the space bar again to exit the program. If you wish, you may rerun the program at any time, select option 2, and enter the file name entered in the previous run. The screens will be reloaded, and the animated display will reappear. After a short examination of the demo program, you will be able to create "slingable" screens for your own applications programs.

We now return control of your programs to you until the next time the little man in the machine says, "We interrupt this program...."

Stuart Greenberg is a programmer and coordinator of microcomputer services for a large corporation. He lives in Holtsville, New York, and is vice-president of the PC User Group of the Long Island Computer Association.

Introducing DataKeep™...

The new data management program that interfaces with other personal computer software to do more things easier.



Now small computer users can have an easy to use, comprehensive information management capability from Mathematica, the company already known for its IBM mainframe RAMIS II® software.

DataKeep can become your core module for creating inputs to the best IBM PC-DOS or MS-DOS software available. Calculate information using your data base, then instantly transfer it to word processor, spread sheet, graphic, or statistical analysis programs.

While conceptually similar to integrated software packages, such as 1-2-3™ or MBA Context™, DataKeep offers you much more. A true data management program, it satisfies the demanding requirements of larger data files and routine processing tasks.

And DataKeep is extremely easy to use. It is specifically designed for non-computer professionals, and comes with a complete primer.

To integrate all your software with DataKeep, see your local computer dealer. You may also contact Mathtech directly by calling our toll free number or mailing the coupon.

Call Toll Free: 800-222-0592

Mathtech, Inc.

A Division of Mathematica, Inc.
P.O. Box 2392, Princeton, NJ 08540
(609) 799-2600

DataKeep is a trademark of Mathtech, Inc. RAMIS II is a registered trademark of Mathematica Products Group, Inc. 1-2-3 is a trademark of Lotus Development Corporation MBA Context is a trademark of Context Management Systems

Mathtech, Inc.
P.O. Box 2392, Princeton, NJ 08540

Send more information on how DataKeep will help me manage more data in less time.

Name _____

Firm _____

Address _____

City _____ State _____ Zip _____

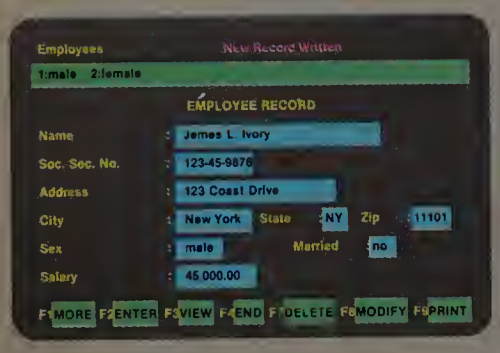
Phone _____
area code

DATAEASE™

The Complete System To Organize Your Business The Way You Want It

You can start using it in minutes, and within hours have a complete application.

It is Easy to Use:



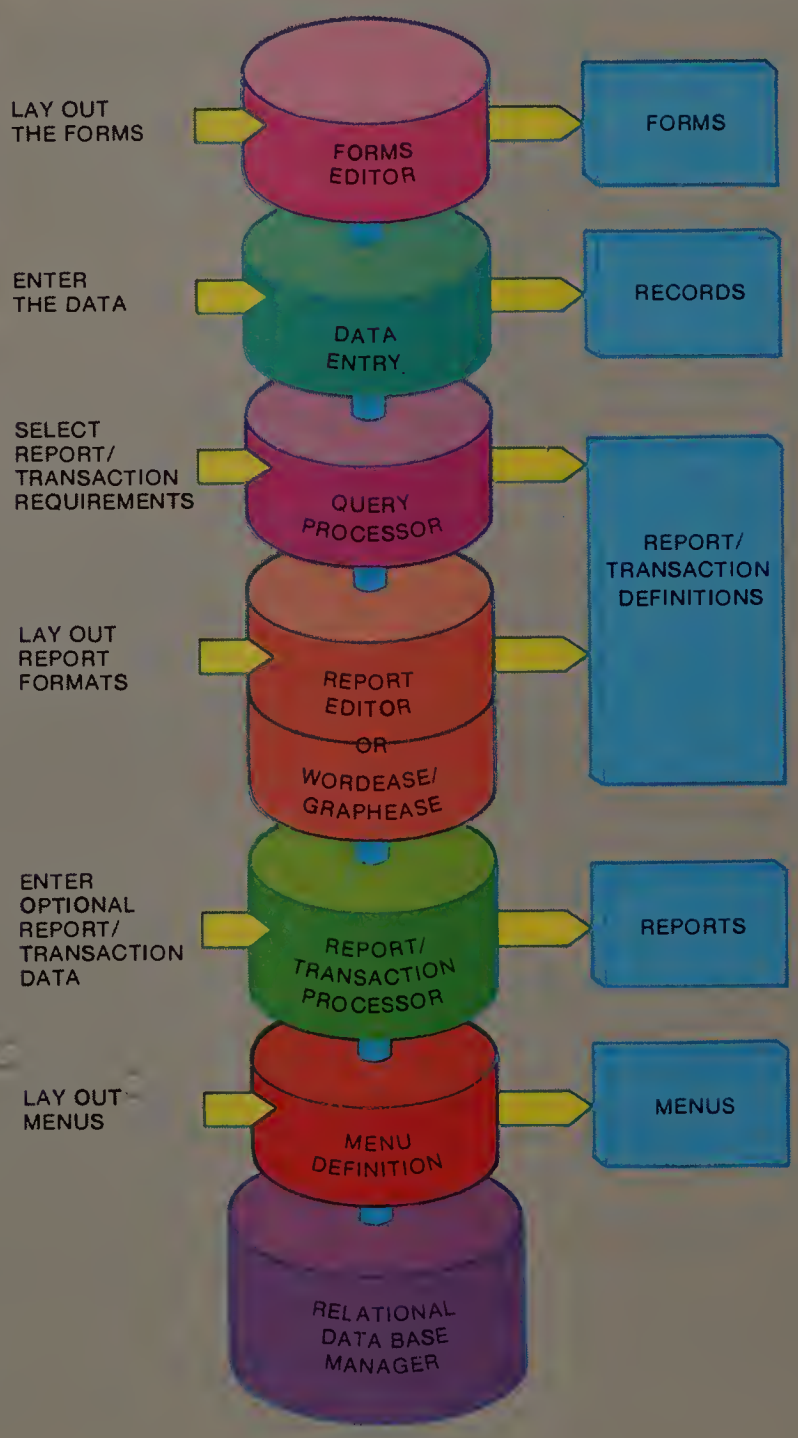
- Fully menu driven to remove the guesswork.
- Full use of function keys with the assignments always displayed. All cursor movement and editing functions on the keyboard are supported.
- Provides full color support and screen style customization.

System Features:

- A list of users can be kept, with passwords and security levels.
- The print style is customizable.
- Data can be interchanged with mainframe computers, other data bases or spreadsheet programs.
- Data base back-up and restore functions are integrated to reduce errors.

System Requirements:

- Available on IBM-PC, DEC Rainbow, TI Professional, Victor 9000, and other 16 bit computers.
- Supports floppy or hard disk drives.
- Supports all popular printers.



It Provides A Complete Range of Features:

- Lay out your forms on the screen. Define data-entry fields anywhere by answering simple questions. Revise the forms any time without losing data.
- Easy, fast and accurate way to fill-in the forms and enter, view or revise records.
- The reports or transactions requirements are defined in the English-like query language by answering simple questions. Select records any number of ways, combine any number of form per report, perform calculations, get totals, sub-totals, or statistical summary. For complete transaction processing, delete, modify or enter records.
- Reports are automatically formatted i several ways, or specify your own for mat using the Report Editor.
- To format a report complete with text data, and graphs; use the optional WORDEASE™ word-processor or the GRAPHEASE™ graphics facility.
- Display or print the report output, or take it to your spreadsheet, word processing, or graphics programs.
- Organize the access to your forms and reports by setting up your own menus.
- The underlying Relational Data Base Manager provides efficient storage and retrieval of records. It uses B-tree indices for efficient accessing of records, and cache memory to retain the most recently used disk sectors t reduce disk access by 50 percent.

These are Some of the DATAEASE Applications:

Inventory Control	Accounting	Medical Office Systems	Social Sciences
Personnel Management	Order Processing	Real Estate	Bibliography
Job Accounting	Market Analysis	Agriculture	Library Management
Mailing List	Financial Portfolio	Distribution Management	School Records

Software Solutions, Inc.

305 Bic Drive, Milford, CT 06460 • (203)877-9268 • (800)243-5123

For information, please write or call. Dealer inquiries welcome.

The Professional Master Menu And Security Control Program For The XT Computer

Whether you're a Fortune 500 Corporation, or an independent businessperson, the question of data security is a very real and important issue to be resolved. That's why we at Sophco have ingeniously designed the answer–**Protec,** the revolutionary new data protection package.

With **Protec,** all of your company's expensive and time consuming data is protected against any external, as well as internal forces, while at the same time expediting user applications.

Using only state-of-the-art technology, **Protec** is security at its best. This powerful protection program is designed to allow the user to create his own individual files using any application program on the hard disk. However, the user's personal files, created by that application, are specially encoded in such a way as to make them completely unattainable to any other user or interloper.

For example, the first thing your employee sees when the XT Computer is activated is the master list of users. In order to proceed, the user must enter into action his own special password which only he knows. For added security, this password is never displayed on the screen in case of any onlookers. Once the computer verifies the password, it then displays onto the master menu screen the available application programs. (Password and application capacity on both is 52).

Let's say the user chooses the program called "EDIX". **Protec** searches out and activates that particular program and the user's own data directory–this is where the user's own personal letters and reports are kept. The user himself can read any of these valuable documents, but he cannot read any other user's information. Likewise, no other user can read any of his–even though all the information was created using the same program, "EDIX".

An additional security feature includes optional file scramble protection. The user designates the scramble-key and the entire file is then mixed together into an unusable order for anyone else except for him. Even a trained industrial spy would find it next to impossible to decode any information should he be lucky enough to get past the password security system.

As the manager of **Protec,** you have the ability to get into the underlying operating system and do all the necessary chores, such as erasing unused files, changing passwords when employees are dismissed, and so forth.

Usually when you wish to access a program on the XT Computer, you call it through the operation system, which is very time consuming. **Protec** eliminates all the complicated key punching and time involved. All you need to do is simply highlight, for example, the word "EDIX" on the menu screen and press the enter key. **Protec** tells the computer which directory "EDIX" can be found in. It calls and activates it *and* finds any and all associated files for that user. Just two simple key strokes and all of the time and confusion is eliminated.

Protec is also designed to be completely "mouse" compatible with your XT Computer, allowing faster and greater ease of use. Plus, if you have a color monitor, **Protec** will show off your data with brilliance, clarity and fashion.

Protec, the Professional Master Menu and Security Control Program for the XT Computer, comes with the same top-notch technical support and expertise that guarantees the quality and reliability of all Sophco software products. So, start protecting *your* company's valuable data today! If **Protec** is not yet available at your local dealer, simply contact us for additional product information. But do yourself and your company a favor, and call us today. **Protec** is a security control progam that's always there, so you don't have to be!

SOPHCO, INC

663 West Aspen Way, Dept. W
Louisville, CO 80027 • **(303) 665-5782**

protec®

SIGMA DESIGNS:

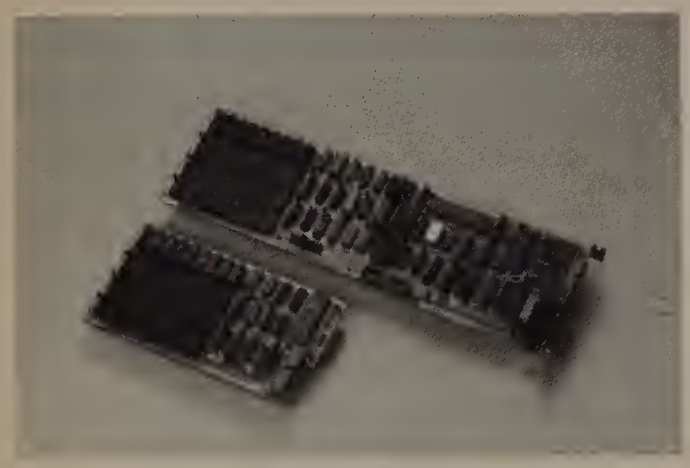
Your Full Line IBM PC Expansion Products Supplier



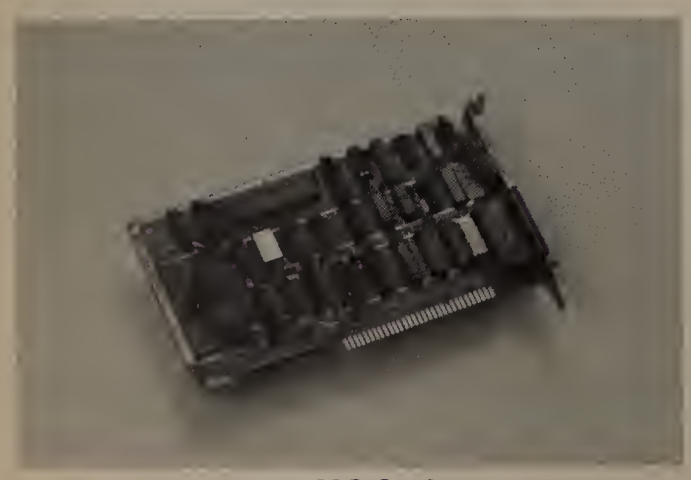
Expansion Chassis/Winchester Disk Subsystem



Subsystem with Two Drives



SDI-ESC + Memory & Stack Board



SDI-SSC Card

The Sigma Expansion Chassis/ Winchester Disk Subsystem:

- Consists of an expansion chassis, one or two Winchester disk drives, and software running under DOS 1.1 & 2.0.
- The Chassis' Expansion Board allows up to 9 add-on function cards, and features a heavy-duty 100W switching power supply.
- When operating under DOS 2.0, the SDI Winchester software can access either one(1) or two(2) 5, 10, 15, and 34 MB 5¼" Winchester disk drives.
- The subsystem is supplied as an Expansion Chassis only, Expansion Chassis with one drive, or with two disk drives.
- Other features include a super quiet fan, shielded interface cable, Driver and Receiver Logic cards to buffer all signals between PC and subsystem, and easy installation.

More Value For Your Dollars:

- **Expansion Chassis (Only)** $795.00

• Subsystem w/ One Drive		• Second Drive	
5 MB	$2095.00	5 MB	$ 895.00
10 MB	2295.00	10 MB	1095.00
15 MB	2495.00	15 MB	1295.00
34 MB	3295.00	34 MB	2095.00

The Sigma family of add-on cards:

- SDI-ESC + Memory: Socketed memory up to 512K (with Stack Board), RS-232 async. port, parallel printer port, clock/calendar, game adapter. Extra async. port when used with Stack Board. $395.00 at 64KB.
- SDI-SSC: Same as above, but without memory. The perfect addition to your new 256K PC or XT! Retails at $265.00. Call your dealer for additional products and price information.

ONE YEAR WARRANTY • DEALER INQUIRIES WELCOME

SIGMA DESIGNS, INC.

2990 Scott Blvd • Santa Clara, CA 95050 • (408) 496-0536 • TELEX: 171240

Reader Service #169

YOU CAN MAKE A FORTUNE IN MICROS!

THE MICRO COMPUTER BUSINESS WILL GROW FROM $10 TO $100 BILLION IN THE NEXT EIGHT YEARS! ARE YOU READY TO CASH IN?

The **micro computer business** is predicted to grow from its present $10 billion to **$100 billion** before 1990! Imagine the possibilities this opens for you! No matter where you live, if you're starting up or presently in business, **no other industry offers you more opportunities!**

Now, finally, all the inside information you need to secure a prosperous future in this dynamic industry is available in **one place - THE COMPUTER ENTREPRENEUR MANUAL!** – An **immense** information source, compiled by our **inquisitive** research team, aided by a panel of **experts** and **business people** from **all areas** of the **computer industry!**

We present the inside story of **more than 100 lucrative computer businesses you can enter**, where you'll find the **real opportunities** for the eighties: from one man operations like **Programming Author, Word Processing Center** or **Consulting**, to **Systems House, Service Bureau, Computer Store etc!** Many at little or no investment! All the invaluable facts and figures: **How to start, Capital needs, Profit estimates and Margins, How to Sell and Market, How missing** technical or business experience **need not stand in your way, Source of Suppliers, etc!** Details that could take **years** to find out on your own!

We'll show you **inside tricks**, like how to **never again pay retail** for computer products and consumer electronics, **even for one item - right now**, while you're starting your business! How to get **free merchandise** and trade show **invitations, etc. This alone** will **more than pay** for the **manual!** You'll read **actual case histories** of other computer entrepreneurs, so you can **learn** from **their mistakes**, and **profit** from their **success stories! Where** you'll be **one year** from now depends on **your actions today!** Let us **show you how** to take the **first crucial steps!**

Order now and take **advantage** of our **limited introduction special, THE COMPUTER ENTREPRENEUR MANUAL**, and a **six month subscription to THE COMPUTER ENTREPRENEUR REPORT/NEWSLETTER** (so you're **always up-to-date** with the industry), **both** for **only** $29.95! **You must** be **convinced** on **how easy** you can **strike it rich** in the micro computer business - or you may **return** the manual for **a full refund** within thirty days! **USE OUR TOLL FREE NUMBER TO ORDER!**



EVERYTHING YOU NEED TO KNOW TO SUCCEED IN THE COMPUTER BUSINESS IS ALL IN THIS MANUAL!

THE COMPUTER ENTREPRENEUR MANUAL has the **answers** to **all your questions** about **selecting, starting** and **succesfully running a computer business!** There has **never** been such a **comprehensive collection** of **know-how** and **information** about this business **in one place! All the facts you need** to plan and **acheive your goals** in **easy-to-follow, step-by-step instructions!**

These are some of the **100-plus businesses** covered in **PART ONE** of the manual, with the facts on **How to start and run, Start-up Cost (Even** how to operate **on a shoestring**), What **profits to expect, Wholesale prices, Mark-ups, Suppliers, future outlook, case histories** for **each, etc:**

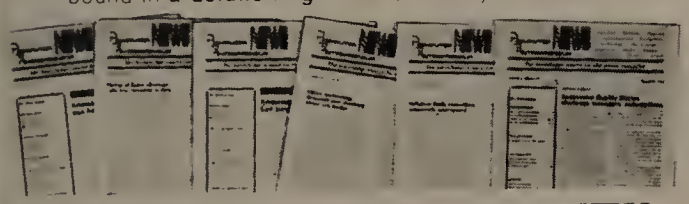
Systems House, Software Author (who to sell to and who to avoid), **Service Bureau, Software Publisher** (How to find programs that sell, **Word Processing Service, Consulting** and **Consultant Broker** (use your skills or those of others, **make** $150 - $1000 **a day!**), **The incredible Games Business, Computer Store** (Franchises: Pro and Contra, or a low inventory store **in your home!**), **OEM, Hardware Mfg, Data base** and **Teletext Service (big prospects!), Used Computers, Repairs, Rent-A-Computer, Promote Fests** and **Trade Shows, Turnkey Systems, Bartering, Mail Order, Compile and rent mailing lists, Specialized Data Headhunting** and **Temp Help Service, Tech Writer Shop, Custom Engineering,** The **highly profitable Seminars** and **Training Business , and many more!**

Many **new ideas** and **ground floor opportunities! Interviews** and **success stories** on **companies** of **all sizes! Privy info on the profits made:** How some **computer store** operators **net** $100 - $250,000! Little known outfits that made their owners **millionaires**, one of these low-key companies, making simple boards, went from **nil to** $20,000,000 and **100 employees** in **four years!** Programmers that make **$300,000, Thousands** of **micro millionaires** in the making, etc!

Whatever your goal is - **Silicon Valley Tycoon**, or just a **business at home** - we **guarantee** you'll find a **business** to **suit you - or your money back!**

PART TWO of the manual is **loaded** with the **know-how** and **"streetfighting" savvy** you need, both as a **novice** or business **veteran**, to get started, to stay and to **prosper** in the micro computer business! **A goldmine of information** in clear and easy-to-use instructions: How to prepare your **Business Plan, Outside financing**, The **mistakes** you **must avoid**, How to **hire** and **manage employees, Incorporation** (when, and how to do it **cheaply**), **Surviving bad times, Record Keeping**, how to **estimate your market before you start**, Use **multiple locations** to **maximize profits**, how to **promote** and **stay** steps **ahead of the competition!** How to get **free advertising, free merchandise, free advice, Power negotiating** with suppliers to **double** your **profit margins, etc!** Even how to **keep a present job while starting a business part time!**

Don't miss this opportunity to be part of this **great industry - the next success story** could be **your own! Order the manual today!** Part one and two, bound in **a deluxe ring binder**, where you can also **collect our newsletter (free for six months with the manual - a** $32.50 **value!) - all for only** $29.95!



THE COMPUTER ENTREPRENEUR NEWSLETTER – ALL THE LATEST INSIDE BUSINESS NEWS! NOW! SIX MONTHS FREE WITH YOUR MANUAL!

You're **always attuned** to the industry and **your manual kept up-to-date**, with our **newsletter!** Each issue has the **latest business news, ideas, new suppliers**, our **indispensible "watchdog" column** on **profits, discounts** (don t miss mfg s promos like recently when top video monitor sold at $80 – that s half wholesale **one third of the retail price!), the competition, the big deals, etc! Feature stories** with start-up info and case histories **on new micro businesses!**

You ll get **invitations** to trade shows and conventions the **usage** of our **advisory service** and our **discount buying service** for your purchases!

You ll find **many items** in our newsletter that will **save you the cost of your manual many times over!**



CALL TOLL FREE!
CHARGE IT!
Credit Card Orders
(MC, VISA only)
accepted 24 hours/day
1-800-227-3800
Ask for extension 1135

MasterCard VISA

Order by phone (Credit cards only), or use the coupon:

Mail to **THE COMPUTER ENTREPRENEUR PUBLISHING CO.**
PO BOX 456, Grand Central Station, New York, N.Y. 10163

Please send me **THE COMPUTER ENTREPRENEUR MANUAL**, and the **six month free subscription** to **THE COMPUTER ENTREPRENEUR REPORT/NEWSLETTER. All for only** $29.95, plus $3 for postage/handling **(NY residents:** add $2 64 for sales tax) If I decide not to keep the manual, I may **return** it **within 30 days** for **a full refund.**

NAME: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

☐ Check or M.O. enclosed Charge to ☐ VISA ☐ MC

CARD# _____

Exp. Date: _____

SIGNATURE: _____

B91

1983, THE COMPUTER ENTREPRENEUR

Special Introductory Prices
At Your Computer Store
September 1.

SilverSoft

The Ultimate in Home Computer Software!

The set of 4 SilverSoft packages gives you everything you ever wanted in home management software. SilverSoft includes:

SilverBudget
A true double entry system. Complete, detailed recording of budget and expense transactions. Will handle multiple checkbooks/credit cards.

"Revolutionize your home budgeting and accounting"

SilverCalendar
Multidimensional scheduling of people, places, and things over time. Will identify conflicts/open times. Scheduling done by days/months /years.

"Throw away your calendar!"

SilverFolio
Allows you to keep track of your personal worth and personal inventory: Personal property, assets, insurance, real estate.

"A complete portfolio with a complete list of financial functions."

SilverWriter
Create and store letters and reports. Maintain a mailing list. Merge letters and addresses for multiple mailings.

"Now simple to use word processing"

SilverSoft

906 N. Main, Wichita, Kansas 67203
316-262-1040

A DOUTHETT COMPANY

Reader Service #251

A first from Micro RIM!





Based on the powerful relational information management (RIM) system like the one used by the U.S. Fish & Wildlife Service and hundreds of major companies, MicroRIM opens new channels of problem-solving versatility and ease with your IBM Personal Computer.

That's because MicroRIM—like no other DBMS software—provides a flexible, easily expandable data base that works much like the human mind. Instead of storing information in fixed structures, MicroRIM organizes your data into dynamic relations. You can combine relations to get information not contained in either one alone. And you can add, change or restructure data fields whenever you want.

MicroRIM is even transportable, letting you transfer data base files from mainframe to mini and micros without redefinition.

Whether your application is business, engineering or scientific research, MicroRIM offers exceptional problem-solving power and ease with your IBM Personal Computer. Anything less would be like swimming upstream.

To learn more, write MicroRIM, P.O. Box 585, 1750 - 112th N.E. Suite A200, Bellevue, WA 98004, or call (206) 453-6017.

Now the same kind of mainframe DBMS power that tracks our nation's salmon is available for your IBM PC.

MicroRIM®
Data Base Management Software for Microcomputers

A Tandy New Peripheral

The new Radio Shack Model 100, a "cable-compatible" add-on to your IBM PC or compatible system

Richard A. Brown

Aren't there times when you would like to be using your IBM PC but have no convenient way to haul your system around? Tandy Corporation's Radio Shack TRS-80 Model 100 may be the answer to your portable computer dreams, making your commute travel time far more productive. Traveling to work via public transportation each day should not prevent you from taking notes, composing letters, and updating or checking your appointment calendar as the miles roll past. Arriving at your destination, you can upload everything you've done on your Model 100 to your IBM Personal Computer or to another computer for further processing. This capability is a two-way street: you can also download from another system to the Model 100. Direct access in either direction is accomplished through a RS-232C serial port.

This communications hookup is quite simple, requiring only a serial board in the PC, a serial cable with the proper DB-25 connectors on each end, PC-DOS, and a null modem. A null modem is an inexpensive serial connector with the wires for pins numbered 2 and 3 cross connected. This strange construction is necessary because the PC and the Model 100 are both designed to use pin 2 to transmit data and pin 3 to receive data. Leaving pins 2 and 3 connected straight across to each other would leave no way for the computers to talk to one another. By crossing these two wires, the Model 100 sends its information to pin 3 on the PC, which is where the PC is expecting to receive data. Tandy also thoughtfully built a serial port into the Model 100.

To make the hookup, you plug the null modem onto either end of the serial cable and then plug the cable into each computer. The PC requires the female end of the cable; the Model 100, the male. That's all there is to the actual hardware connection.

> The Model 100 handles portable word processing quite admirably.

To utilize this setup, bring up the Telcom program on the Model 100, then use the Status function key, <F4>, to initialize the correct communications parameters. To enter the Terminal mode press <F4> again, and you're almost ready to start trading data between the two machines.

The next step is to use the Mode program that comes with PC-DOS to configure the serial port on your PC to match the parameters set on the Model 100. Put a formatted disk in drive B and give the command to copy the data arriving at the serial port to a disk file. Use a file name such as DATASWAP.TXT, and then issue the command

COPY AUX B:DATASWAP.TXT

This causes the information being received at the serial port to be written to a file on drive B named DATASWAP.TXT

Next, use the Upload function key, <F2>, on the Model 100 and indicate which file you want to send to the PC. This procedure may be slightly different if you have a compatible system, so consult your user manual.

Data to Go

Now that you can upload information from the Model 100 to the PC, how about downloading information from the PC to the Model 100? First, use the Model 100's Download function ,<F2>, to prepare the computer to accept the file. The command syntax for the PC to send the requested file out the serial port is

COPY B:DATASWAP.TXT AUX

Naturally, if you have a modem communications program for your PC, it could be used to eliminate the requirement of manually setting the serial port using the Mode command. Communication speeds of these programs are probably limited to the


Radio Shack
TRS-80
MODEL 100
PORTABLE
COMPUTER
LOW BATTERY
BREAK
PASTE
LABEL
PRINT
PAUSE
DEL
BKSP
ESC
TAB
CTRL
CAPS
LOCK
SHIFT
ENTER
CODE
NUM
GRPH

300 to 1200 baud range, the speeds at which most modems run. Transfer of information may take a little longer at these speeds, but if you're not comfortable using the Mode command, a communications program is the most painless method of transferring your data. This uploading capability of the Model 100 makes it a genuinely first-rate portable peripheral for the PC.

Touching is Believing

The keyboard and display are the computer's most important user interface components. The Model 100 sports a full-sized, typewriter-style keyboard. This "qwerty" keyboard is equivalent to the type found on most full-sized desktop computer systems. The full ASCII character set, as well as another 128 graphics and foreign language characters, are available. The "upper" 128 graphics characters are proprietary (see Figure 1) and are not the same as the PC's graphics characters. To print these characters, a printer must be equipped with the same graphics character set. Use of the <Num> key activates a numeric keypad built into the keyboard, which makes entry of large quantities of numerical data far easier. The keys bottom easily and produce the characteristic clicking sound so familiar to users of the PC. Take the Model 100 on your commute to work, and you'll notice more than a few people turning their heads to look for the source of the rhythmic clicking.

There are 16 function keys, of which 8 are programmable. Four programmable keys are dedicated to commands and four are used for cursor control (see Figure 2). I would have preferred these keys to be the same size and shape as the keyboard keys. Instead, they are small rectangular buttons, placed much too close together in four clusters of four keys each. Especially troublesome are the cursor control keys. These keys would have been better laid out in a diamond-shaped pattern instead of a straight-line arrangement. These special keys are the only weak point in an otherwise excellent keyboard. Many other operations are performed through use of the <Ctrl> key in conjunction with a keyboard key (see Figure 3). I spent extended periods hammering away on the Model 100 keyboard with little or no fatigue.

The large display (by portable standards) is a 320-character liquid crystal display (LCD) of 8 lines by 40 characters. Compare this to the 12- to 32-character displays offered by most of the Model 100's competitors. A small rotary switch adjusts the display's intensity to provide comfortable viewing.

The large display (by portable standards) is a 320-character liquid crystal display (LCD) of 8 lines by 40 characters.

If you're used to the more conventional 80-character by 24-line display, however, you'll need time to adjust to the screen of the Model 100. I soon adapted, and considering the convenience that portability offers, the display is adequate for most applications. The character set is easily readable, but the overhead lighting glare reflected from the LCD's glass covering is annoying. Repositioning the computer should correct that inconvenience.

Peripheral Vision

The Model 100's efficient keyboard and display are just the beginning. I've already discussed one manner of communication, machine to machine, but the Model 100 has other ways of communicating with the outside world. Along with the serial port and built-in modem plug, a parallel printer connector is tucked away inconspicuously on the Model 100's back panel. This feature negates one of the hidden costs of owning a personal computer: the necessity of purchasing additional input/output (I/O) boards before you can communicate with other devices.

A plug is also provided for a bar-code reader device attachment. This would be especially handy for a business that uses the bar-code marking method on its sales items. Bar-code technology also has potential as an inexpensive method of publishing and distributing software. Imagine carrying around your applications software in a loose-leaf notebook instead of in boxes of cassette tapes or floppy disks. When you want to run a particular program, simply wave your magic wand over the appropriate page, and you're up and computing.

How large a notebook would you need for an applications program? Consider the memory capacity of the Model 100 and the fact that in reality 1K to 2K of data can be sorted on a current page of bar code; anything more than 20K becomes impractical. Bar-coded software, however, is nonvolatile and certainly less susceptible to damage than a cassette tape or floppy disk.

Future plans for the Model 100, though speculative, could prove exciting. Tandy has included a plug-in socket on the bottom of the Model 100 for alternate ROM modules. (The possibility of a plug-in spreadsheet program was the topic of discussion at a local Radio Shack Computer Center.) Although the Model 100 screen strikes me as a bit small for extensive spreadsheet work, some specially developed applications for real estate agents, field engineers, or anyone on an expense account seem likely future applications.

Located next to the plug-in ROM socket is a connector to bring internal bus signals out to an external device. This might extend the amount

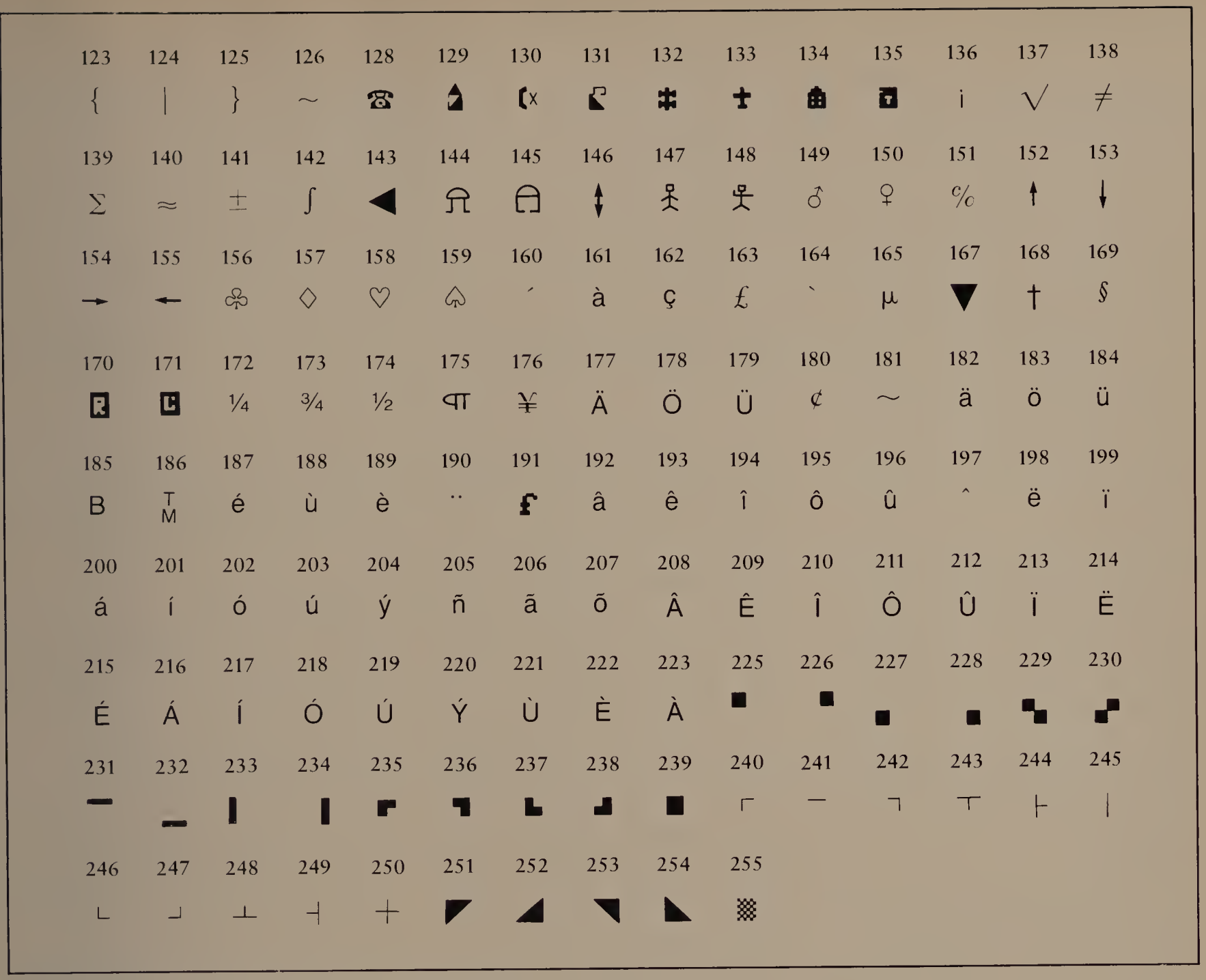


Figure 1: The Model 100's graphics character set

of RAM that could be used and could mean an interface with microfloppy drives. Tandy claims, however, to have no plans for such a disk storage device. One of the most likely applications for this bus extender is as an external monitor connector. While peeking around in the operating system and experimenting with the machine's capabilities, I was surprised to find a designation for a device named CRT. If this stands for the traditional cathode-ray tube, it seems a safe bet that Tandy plans to expand the viewing area. This would make the Model 100 an even more attractive machine.

A Carry-On Word Processor

The Model 100 handles portable word processing quite admirably. To see how effectively the computer cooperates with the user, imagine that you're on an airplane in transit to an important business meeting. Due to your rushed workday, the critical speech you're to give to the executive board only a few hours from now still hasn't been polished. However, you don't look quite as concerned as the other businesspeople on board, who are fidgeting with their seatbelts as the plane taxis for takeoff.

Once you're airborne and the seatbelt sign goes off, the sound of briefcase locks snapping open echoes throughout the cabin. Reams of paper are shuffled on various laps, and Osbornes and COMPAQs remain tucked uselessly beneath the seats. You smugly remove your Model 100 from its soft carrying case and are immediately ready to review your speech and put the final touches on it.

You turn on the power switch and the main menu greets you, showing the current day and date, time, amount of free RAM, the names of the four ROM-based programs, and up to 19 of your own file names. You place the cursor on a file named SPEECH.DO. The .DO indicates that this file is a document. You press <ENTER> and the text editing program, Text, is automatically invoked. The cursor is p ced at the beginning

of the file. As the closing remarks need the most work, you press the key combination of <Ctrl>-<CursorDown> to move directly to the end of the file.

Your closing comments are superb—crisp and concise, reemphasizing the main points covered in the speech. The information about the company's marketing plans for the next year doesn't belong in the fifth paragraph, however. It should be moved from its present location to a position directly after the sales figures for the first and second quarters of the year.

Pressing <Ctrl>-<CursorUp> returns the cursor to the beginning of the speech. The marketing details must be located for moving to the appropriate location. The assignments that the Text program gives to the function keys are accessed by pressing the Label command key (Figure 4 shows the function key assignments for the ROM-based Model 100 programs). This display is shown on the eighth line.

After pressing the Find function key, <F1>, you enter marketing and press <ENTER>. The program searches through the file, beginning at the present cursor position, for the word *marketing*. When the search word is found, the cursor is positioned in the file at the first occurrence of the designated word. This is not, however, the entry you want. Simply press <ENTER> again, and the cursor is moved to the next occurrence of the search word.

Once the exact entry is found, a quick glance at the status line shows you that the Select function, <F7>, marks the text to be cut. As you press <F7> the character under the cursor changes to inverse video (white character on a black background). You use <CursorRight> to move to the right in the text. Each character the cursor passes over changes to inverse video, indicating that the text has been designated for the maneuver. As this is a large block of text, you use the <Shift>-<F7> key combination to select a screenful of characters to be changed. <Shift>-<CursorDown> moves the cursor to the following screen, and <Shift>-<F7> continues to mark each screen for the move.

The last part of the speech is finally marked to be moved. The Cut function key, <F5>, lifts all of the characters displayed in inverse video out of the file. These characters are placed in a holding buffer (a separate area of the Model 100's memory). Again, press <F1> (Find) and enter Sales 1983 as the search characters. The cursor is placed at the beginning of the sales information section of the speech. You move the cursor down to the location at which the marketing plans should be inserted and press the Paste command key. All of the text that was marked and cut is repositioned at the current cursor location. If you had wanted to duplicate a portion of the text, you would have used the same procedures, but instead of the Cut function key, you would have pressed the Copy function key, <F6>.

Once your speech is edited satisfactorily, you can save the corrected copy by pressing the Save function key, <F8>. The text file is updated and you automatically exit the Text program and return to the main menu. The editing, cutting, and pasting have been accomplished with elegant ease, and without memorizing complicated control sequences or calling in program overlays. All of the Text program's capabilities are immediately available through one or two simple keystroke sequences.

Key	Operation
Label	Prints the definitions of the function keys
Print	Equivalent of entering LCOPY
Shift-Print	Equivalent of entering LLIST
F1	Equivalent of entering FILES
F2	Equivalent of entering LOAD
F3	Equivalent of entering SAVE
F4	Equivalent of entering RUN
F5	Equivalent of entering LIST
F8	Equivalent of entering MENU

Figure 2: BASIC key word operation

Calendar Control

Things have gone well for you today. Perhaps too well? Something must have been forgotten. Since you're still looking at the Model 100's main menu, you can position the cursor over the Schedl file and press <ENTER> to access the Calendar file. The mini-data manager program is invoked, and the function keys status line tells you that <F1> performs the Find feature. Pressing <F1> and entering your city of destination causes Schedl to show all entries having city names as part of the data. When nothing shows up on the LCD display, you press <F1> again and enter the current date. All of the entries containing today's date will then be displayed. The eighth line of the display changes to tell you that pressing <F3> will display more entries because there are more matches with today's date than can be shown at one time on your display. Press <F4> to quit the search.

Since the notes currently on screen have already been taken care of, you press <F3> to see more entries. The second screen reveals a reminder that tomorrow is your supervisor's birthday. That means a call to your assistant once you get off the plane, so that a card can be sent to your boss. Using <F3> to skim through the remaining notes, you find nothing else

Control code	Operation performed
Ctrl-A	Moves the cursor to the beginning of the first word to the left
Ctrl-B	Moves the cursor to the end of the file
Ctrl-C	Cancels a SELECT, SAVE, LOAD, FIND, or PRINT function
Ctrl-D	Moves the cursor one character to the right
Ctrl-E	Moves the cursor up one line from the current line
Ctrl-F	Moves the cursor to the beginning of next word to the right
Ctrl-G	Saves a file or program
Ctrl-H	Deletes the previous character
Ctrl-I	Tab function
Ctrl-L	Identical to the Select function key
Ctrl-M	Carriage return and line feed
Ctrl-N	Identical to the Find function key
Ctrl-O	Identical to the Copy function key
Ctrl-P	Printer codes embedded in a text file—these codes appear on the display but are not printed by the printer
Ctrl-Q	Moves the cursor to the left-most position of current line
Ctrl-R	Moves the cursor to the right-most position of current line
Ctrl-S	Moves the cursor one character to the left
Ctrl-T	Moves the cursor to the top of the display in the current column
Ctrl-U	Identical to the Cut function key
Ctrl-V	Identical to the Load function key
Ctrl-W	Moves the cursor to the beginning of the current file
Ctrl-X	Moves the cursor down one line from its current position
Ctrl-Y	Prints the entire file
Ctrl-Z	Moves the cursor to the end of the current file

Figure 3: Control key operations

amiss. The Text program could be used to edit your Schedl data file to add new appointments and notes, or to delete old material. Now, it's time for a rest if the shuffling of papers elsewhere on the plane doesn't disturb your peace.

Modem Maneuvers

Once you've settled in your hotel room, you compose an important memo to be sent to your home office and you remember that you should check The Source for some messages you've been expecting. Once again, you remove the Model 100 from its case along with the modem connection cable. If the hotel room is equipped with modular-style jacks, the connection is exquisitely simple. Attach one end of the cable to the

jack in the rear of the unit and plug the other end into the wall telephone outlet. Hook up the cassette recorder and its connecting cable to your computer, press Play on the recorder and enter the Text program. At the file name prompt, you type in the name under which you saved your memo and press <ENTER>. Since this file is not currently in the Model 100's memory, the LCD display is blank, as if you were going to create a new file.

entry containing this word. This is the entry you have used to designate the phone number of your office computer, so the number appears on the screen.

The Call function key, <F2>, activates the auto-dial feature of the modem, and each digit of your office phone number appears on the screen, one at a time. This number is a dial-in port to the mainframe your company has hidden in the basement. Since you have included your log-on sequence and password in the Addrss

around to see if any new items have been added to the IBM bulletin board, it's time to log off. All of the downloaded information is safely stored for later retrieval.

BASIC Elements

If you program in BASIC on your PC, the transition to the Model 100 is easy. The BASIC languages for the PC and the Model 100 were both developed by Microsoft and, therefore, share many of the same statements. Since the Model 100 does not cur-

Applications of function keys

Programs	F1	F2	F3	F4	F5	F6	F7	F8
BASIC	Files	Load	Save	Run	List	———	———	Menu
Text	Find	Load	Save	———	Copy	Cut	Select	Menu
Telcom	Find	Call	Status	Terminal	Echo	Wait	———	Menu
Addrss	Find	———	———	———	Lfnd	———	———	Menu
Schedl	Find	———	———	———	Lfnd	———	———	Menu

Lfnd performs the same procedure as Find, except that the information is printed to the printer instead of the computer's display.

The four command keys—Paste, Label, Print, and Pause—and the four cursor movement keys perform the same operations in all of the Model 100's applications programs.

Figure 4: Program key definitions

Pressing the Load function key, <F2>, causes the prompt "Load from:" to be displayed. Enter the name you gave to your memo when you last saved it by pressing <F3>. The cassette tape begins to roll, and soon the memo appears on the screen. Now you know that the file has been loaded into memory and is ready to be transmitted via the modem.

To accomplish this, exit the Text program by pressing <F8>. Then position the main menu cursor over the Telcom program, and press <ENTER>. When Telcom comes up, pressing <F1> activates the Find feature. At the prompt for a search string, you enter office and Telcom searches your Addrss data file for any data file, the Model 100 automatically signs you onto the system and begins the Terminal mode. Once contact is established, the Up function key, <F3>, results in a prompt for a file name and then uploads your memo to the office mainframe.

After logging off the office computer, you press <F1> while still in Telcom to search for The Source entry. <F2> does the dialing and logon for you. When you check The Source mailbox, you find the messages you were waiting for, so you press <F2> to activate the Download function. The Download feature saves everything being sent by The Source as you skim through the mail. You can come back later and read all of it in depth at your leisure. Once you've captured your mail and browsed

rently support disk drives, you'll find that the BASIC used in the Model 100 resembles the ROM-based, cassette version of BASIC on the PC. There are a few minor differences, such as the SCREEN statement. On the PC this command sets up attributes for screen memory, color, etc. Due to the limited screen capabilities of the Model 100, its SCREEN statement serves to determine if the eighth line of the display will be used to indicate labels for the assignments of the eight function keys.

Model 100 BASIC supports double- and single-precision numbers, as well as integers. The character-string handling facility is sufficient for most needs but it is not as powerful as that for the PC. Complete file operations are supported, and match capabilities

Under the Cover

The Radio Shack TRS-80 Model 100 unit weighs 3.9 pounds and is 2 by 11⅞ by 8½ inches. The unit is powered by four AA-size batteries. It includes a built-in 300 baud, answer/originate modem, peripheral and computer I/O, a real-time clock and calendar, and four applications programs. It is expandable to 32K of RAM.

The Model 100 is densely packed with low-power complementary metal-oxide semiconductor (CMOS) memory chips. The microprocessor is the 80C85, a low-power version of the old 8085, running at 2.4MHz. This microprocessor is a member of the 8080/Z80 family, which has a substantial base of applications programs. Converting a significant portion of that software for the 80C85 should be relatively easy.

The extensive interrupt capabilities of the 80C85 are well exploited through BASIC and can cause your program to jump to an interrupt handling subroutine if an interrupt signal is generated from the serial port, modem, a function key, or a preset value from the real-time clock. These interrupt features may be enabled or disabled with a simple BASIC statement. Additionally, even if they are disabled, the computer may be instructed to remember whether an interrupt request was generated.

The modem circuitry provided is limited to generating pulse dial signals (the type of signal produced by a rotary dial phone) because the newer tone dialing signals are not currently available in CMOS technology. This means that if you use some of the alternative long-distance phone systems or your business phone system requires tone dialing, you have to manually dial the phone numbers before initiating the Telcom program.

Auto-dial and answer/originate modes are supported for the 300 baud, Bell 103 compatible modem. Communications parameters can be set to match almost any system you want to access. The modem can be configured for either full- or half-duplex operation, Xon/Xoff protocol may be enabled or disabled, and word lengths of 6, 7, or 8 bits are supported. Parity choices are odd, even, none, or ignore. You may specify 1 or 2 stop bits, and the dialing pulse rate can be set for either 10 or 20 pulses per second.

The bidirectional serial port allows the same choice of parameters as the modem and may be set up to operate at speeds from 75 bps to 19,200 bps. Because the modem and serial port share much of the same circuitry, they can't be operated simultaneously.

The parallel printer connector uses a 26-pin dual-row connector to attach the parallel printer cable, which is available from Radio Shack. Installing this printer cable provides a standard Centronics parallel connection, allowing communication with any printer that uses this common interface.

The cassette tape option operates at 1500 bps, significantly faster than the usual 300 bps, and loads and saves data at a rate of approximately 70 words per second. During program loading, the bit stream is passed through the piezoelectric speaker. This is a throwback to the early days of personal computers when it was possible to determine the probable success of a load by listening to the bit stream. This feature can be disabled through BASIC.

include the expected operators and transcendental functions. However, the language does not include the capability to define a function at the beginning of a program and later call it by its defined name. Nor is the program able to clear (ERASE) an array to redimension it, thereby clearing RAM space. With such limited memory available, it would be nice to reclaim some RAM once an array had served its purpose.

The Model 100 has a unique command that controls the automatic power-down feature. As with many new pocket calculators, the Model 100 monitors time between keyboard inputs. If you ignore the computer for an allotted amount of time, it automatically powers-down the operating system to conserve battery life. The factory default is 10 minutes, but this is adjustable to between 1 and 25½ minutes, or it may be completely disabled.

The computer may also be programmed to power-down at a certain time, or at a particular point in program operation, and then to resume operation where it left off when the power is once again applied. Some interesting applications ideas come to mind when the Model 100 is combined with the included modem.

You could set the computer up to receive a file from another computer late at night, when telephone rates are lowest. At your convenience the

next day, turning the computer back on could cause it to display the received file or, if hooked into the PC, to automatically upload the information for you.

If you do much programming, the ability to use the Text program to edit your BASIC programs will be appreciated. While in BASIC, typing EDIT and the line number or range of line numbers to be edited causes Text to be invoked automatically. Full-screen movement is supported and program line changes are not implemented until <F8> is pressed to return to BASIC. However, caution is advised—as with editing text files, your original file is the one being edited. Since any changes made become permanent, use the Copy function to prepare a duplicate version of your program for debugging purposes. The BASIC supplied with the Model 100 is powerful enough to accomplish most tasks you will want to run on this portable computer.

Pixels and Poking

The Model 100's individual display pixels can be turned on or off. Since this is accomplished through program control, graphic displays can be produced. Although the limited display doesn't provide much room, people will soon find amusing ways to use the computer's graphic capabilities. (Don't expect to find Pac-Man up and running on the Model 100 anytime soon.) The Model 100 also has statements for loading, saving, and calling machine language programs, though no system monitor is provided to allow direct memory access. The documentation provides you with some information on calling a few machine language routines included in the 32K ROM, such as how to reset the function keys to their default assignments. A more complete listing of locations to call some of the routines used by the programs included in the 32K of ROM would have been a useful feature. If this information were available, it could be incorporated easily into a BASIC program to conserve memory and speed up program operation.

Error Help

I found the error messages used by the Model 100 to be rather cryptic. If you worked with the computer long enough, you would probably get used to them. The syntax for error messages consists of a two-letter error type identification code followed by the word *error.* You could run across the message "DD Error" and never realize that it was presented because you tried to redimension an array. I see no good reason for such abbreviated error prompts, especially with a 40-character display. A more descriptive message would go a long way toward making program debugging a less tedious task. While trying to decipher one of these cryptic messages, I discovered no less than four undefined error types in a table in the documentation.

Source of Life

Radio Shack has combined the best of two worlds to supply power to the Model 100. You have the choice of using either internal batteries or the optional AC power adapter. The Model 100 actually uses two sets of batteries: one set maintains the contents of RAM and the other provides the power for the operating system whenever the machine is turned on. The operating system runs from either the AC power pack or four AA-sized dry cells. The contents of RAM are maintained by rechargeable Ni-Cad (nickel-cadmium) batteries, which provide the power to hold data for up to 30 days before they need to be recharged. The recharging process is automatically accomplished from either the operating system batteries or the AC power adapter.

The four AA batteries that power the operating system run the Model 100 for about 20 hours. A low-battery indicator light warns you when the batteries are down to about 15 minutes of operating life. I was, however, able to use the computer for almost 2 hours after this indicator came on with no ill effects. Even if you totally drain the operating batteries, there is no need for concern about the Model 100's memory contents—the Ni-Cads hold the contents even though there may not be enough power to operate the computer.

Storing Questions

I do not like to use cassette tape for mass storage. Tape requires considerably more attention on the part of the operator; you must always be aware of which buttons are pressed on the recorder before initiating any tape-access operations. Until you adjust to using this medium, be prepared for a few nasty surprises.

Tandy plans to support the Model 100 with a comprehensive line of options and accessories.

Beyond the inconvenience of having your data stored in sequential access format, which means rewinding the tape if the current location is beyond the area you want to access, loading and saving data can be tricky.

You may find that a program or data you thought was saved has actually disappeared because you forgot to press the record button. Even worse, an attempt to load a program or read in data with the record button still pressed causes the tape to be erased. Backup of information requires that all operations be performed twice (once for the original and once for the backup), or you need another way to duplicate your tapes.

The problems don't end there. Because of the design of the recorder-control interface, you cannot use just any cassette recorder as your data storage device. The Model 100's cassette connector cable consists of three leads. One writes the data to tape, one reads the data back into the computer, and the third controls the recorder motor. The inclusion of the motor-control capability, while making tape easier to use, requires that you use a recorder with connectors for the type of microphone that includes a remote off/on switch. Without this remote motor control, you are unable to save or load data from the newer type of recorders that use a built-in microphone.

Accessories

Tandy plans to support the Model 100 with a comprehensive line of options and accessories. An acoustic coupler is available for those times when a modular phone jack isn't handy. This cable allows you to send and receive information using a public phone booth or any phone not fitted to the modular system. Also available is a briefcase designed to hold the computer, a cassette recorder, and all associated cables. Connector cables for attaching a parallel printer or serial device are available, as is the null modem.

A 224-page operator's manual, and a smaller, 40-page quick reference guide are included in the purchase price. The former is a hands-on user guide for the Model 100. A series of informative appendices discusses using the modem and the cassette recorder, and interfacing the Model 100 to other computers. The reference guide contains the bulk of the manual and also some technical material.

Software for the Model 100 is already being advertised. At least one national user group is being formed around this computer. If the trend continues, this little wonder could become a powerful contender in the lap-sized portable market. If you need the convenience of a truly portable computer with the ability to trade information with your PC or PC-compatible machines, the Model 100 deserves serious consideration.

Richard Brown is a technical support representative for a company that produces PC-compatible applications software.

Radio Shack TRS-80 Model 100 Portable Computer
Radio Shack/Tandy Corporation
1500 One Tandy Center
Ft. Worth, TX 76102
817/390-3700
List Price: $799 with 8K of RAM; $999 with 24K; $119.95 for memory upgrade blocks of 8K, up to a maximum of 32K, plus a $15 installation fee

WHY YOU NEED COPY II PC:

1. COPY II PC allows you to backup your protected software. And unlike other backup programs, COPY II PC makes exact copies without modifications to the software on the duplicate disk. This assures maximum reliability and compatibility with the widest range of protection schemes. COPY II PC handles sector timing, multiple sector sizes, and bad sector ID's as used for disk protection verification.

2. COPY II PC is a complete replacement for "DISKCOPY" on your PC-DOS diskette. It formats, copies, then verifies the duplicate disk (DISKCOPY does not verify). COPY II PC automatically uses all the memory in your PC, and adjusts for single/dual sided diskettes. A drive speed utility helps keep your drives in top condition.

For your convenience, COPY II PC is not copy-protected.
Available at fine computer and software stores or direct from:

IBM

Reader Service #31

CENTRAL POINT Software, Inc.

P.O. Box 19730-203
Portland, OR 97219
(503) 244-5782

$39.95
(plus $2 for S/H)

Attention Apple owners: Call us about backing up your protected software with Copy II Plus!

Reader Service #31

A sleeping giant is about to awaken.

LATTICE™ C

Exclusively from Lifeboat Associates.

If you're serious about writing your next program in C (and you should be), check out the competition, then take a good look at Lattice C. We think you'll come to the same conclusion we did: Lattice C is the finest 16-bit C compiler on the market today.

Completeness...

Lattice C is a full implementation of the C language as defined by Kernighan and Ritchie (the standard in the C world) including all standard keywords, functions, and commands.

Performance...

Lattice C is the fastest sixteen-bit C compiler you can buy. Fast in execution, and fast in compiling. Lattice C produces compact code, with many load modules as small as 500 bytes.

Industry Acceptance...

Major manufacturers and software developers already recognize the strength of Lattice C. New products created with Lattice C include spreadsheets, word processors, and data base managers.

A Total Development System...

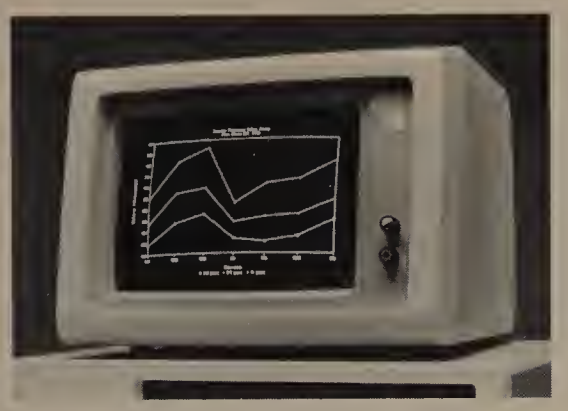
The serious software developer will also want **C-Food Smorgasbord™**, a complete C toolkit including BCD decimal arithmetic package, screen and i/o utilities.

Lattice C runs on a wide variety of computers including the IBM®-PC, Wang PC™, TI Personal Computer™, DEC Rainbow™, Victor 9000™, and other compatible 16-bit microcomputers operating under PC-DOS®, MS™-DOS, CP/M-86™, Concurrent CP/M™, SB-86™ and the Intel™ UDI system. Price: **Lattice C** $500 **C-Food Smorgasbord** $150

Lifeboat Associates

1651 Third Avenue, NY, NY 10028 (212) 860-0300 TWX: 710-581-2524 (LBSOFT NYK) Telex: 640693 (LBSOFT NYK)

Prices and specifications subject to change without notice. Prices F.O.B. New York. Shipping, handling, C.O.D. charges extra. Lattice C and C-Food Smorgasbord, TM Lattice, Inc. IBM and PC-DOS, reg. TM International Business Machines. CP/M-86 and Concurrent CP/M-86, TM Digital Research. SB-86, TM Lifeboat Associates. TI Personal Computer, TM Texas Instruments. MS, TM Microsoft. WANG PC, TM Wang Laboratories. Victor 9000, TM Victor Corp. DEC Rainbow, T M Digital Electronic Corporation. Intel, [illegible] Corporation. Copyright 1983 Lifeboat Associates.



Getting **1-2-3**™ to do graphics on an IBM® Monochrome takes a lot...

Exactly one Hercules Graphics Card.™

What a lot of people have learned the hard way is that you can't run 1-2-3's graphics on the IBM PC monochrome display. That is, until now.

Now, with the Hercules Graphics Card, you *can* run 1-2-3's graphics on the monochrome display. (Of course, 1-2-3's spreadsheet and information management functions work too.)

But naturally the Hercules Graphics Card does a lot more than just make a great program like 1-2-3 better. It gives you high resolution bit mapped graphics on the monochrome display—something the IBM monochrome card simply can't do.

The Hercules Graphics Card replaces IBM's monochrome card giving you text compatibility *or* two pages of graphics, each with a resolution of 720h × 348v. You'll get the monochrome's high quality character set, software compatibility with programs like VisiCalc,® WordStar® and dBase II,™ and a printer interface for any parallel port printer.

Included with each Hercules Graphics Card is software that enables you to use the PC's BASIC graphics commands. Or you can program in other languages and use Graph X,™ our set of assembly language graphics subroutines. (Graph X is available now for only $50 and includes a graphics screen dump.)

The Hercules Graphics Card. Only **$499.** A small price to pay for graphics on the monochrome display. Call or write for the name of the dealer nearest you.

Hercules Computer Technology
2550 9th Street
Suite 210
Berkeley, CA, 94710
(415) 540-6000

©1983 Hercules Computer Technology



HERCULES

Graphics software requiring the IBM Color Graphics Adapter is not compatible with the Hercules Graphics Card. Hercules compatible software from other vendors includes programs for business graphics, CAD, and word processing with scientific characters. Call or write for more information.

Hercules Graphics Card and Graph X are trademarks of Hercules Computer Technology. 1-2-3 is a trademark of Lotus Development. IBM is a registered trademark of IBM. VisiCalc is a registered trademark of VisiCorp. WordStar is a registered trademark of MicroPro. dBase II is a trademark of Ashton-Tate.

Reader Service #77

Perfect Compatibility

IBM & ACP

When you need competitive prices,
prompt service and complete support, call us.

HARDWARE

DISK DRIVES

Davong
5 MB Internal Hard Disk $1465
10 MB Internal Hard Disk $1695
(Includes power-supply, controler card and software)
Control Data
Full-Size 320K DS/DD ..... $ 235
TEAC, Hitachi, Matsushita
Half-size 320K DS/DD w/brackets .. $ Call
Slimline 640K DS/QD w/brackets ..... $ 310
TallTree Systems JFormat software ... $ 25
Maynard Electronics
Modular Disk Controller Card ..... $ 195
Standard Disk Controller ..... $ 155
with serial port ..... $ 219
with parallel port ..... $ 209
Scotch/3M DS/Diskettes (box of 10) ... $ 39

EXPANSION BOARDS

AST Research
(All AST boards come with SuperDrive, Superspool, and one year warranty)
ComboPlus 64K upgradable to 256K, with clock calender, serial and parallel ports ..... $ 280
MegaPlus-E 64K upgradable to 256K, (or 512K with MegaPak) with clock calendar and serial port ..... $ 280
MegaPak 256K upgrade for Megaplus $ Call
I/O Plus II clock calendar and serial port ..... $ 115
Parallel port, second serial port, or Game adapter ..... $ 35
Memory Upgrade Set (9 chips) 64K .... $ 55
Connectall Bracket for extra cables ... $ 15

Maynard Electronics
Modular SandStar Series
(Best Prices) ..... **$ Call**

MODEMS

Hayes
Smartmodem 1200 ..... $ 509
Smartmodem 300 ..... $ 209
Smartcomm comunications software $ 99
Smartmodem-to-IBM six foot cable ... $ 25
MicroStuf
Crosstalk communications software ..... $ 119

PRINTERS

C.itoh
Starwriter F10-40PU 40cps $1395
Printmaster F10-55PU 55 cps $1695
Epson
MX-80 F/T, Graphtrax II ..... $ Call
MX-100 F/T, Graphtrax II ..... $ Call
FX-80 F/T, Graphtrax II ..... $ Call
RX-80 ..... $ Call
NEC
3550 ..... $1895
Okidata
Microline 83A F/T 120 cps, 132 cols .... $ 655
Microline 92 160 cps, 132 cols, Okigraph, correspondence quality ..... $ 535
Microline 93 F/T 160 cps, 132 cols, Okigraph, correspondence quality ..... $ 890
Microline 84 F/T 200 cps, 132 cols, Okigraph, Correspondence quality ... $ Call
All printer cables ..... $ 30
We carry a full line of printer accessories

OUR POLICY

* We accept VISA, Mastercard, Money Orders, Certified Checks, Cashiers Checks, Personal Checks, Wired Funds.
* We do not charge your card until we ship
* No surcharge added on VISA and Mastercard
* Allow one week for personal and company checks to clear.
* COD maximum $500. Cash or Certified check on delivery.

SHIPPING

United States: For monitors, printers, and hard disk drives add 2% to all orders. Blue Label and Next Day Air available. For all other items add $3.

1-800-223-3860

MONITORS

AMDEK
Color II RGB Hi Res ..... $ 590
Video 300 Green (Graphics card) ..... $ 155
Video 300 Amber (Graphics card) ..... $ 165
Video 310 Amber (monochrome card) ..... $ 185
(We supply cable for all Amdek monitors)
Princeton Graphics
PGS Hi Res RGB Monitor with cable ..... $ Call
USI
Pi2 Green (Graphics Card) ..... $ 155
Pi3 Amber (Graphics Card) ..... $ 165
MultiDisplay Card ..... $ Call
(We supply cable for all USI monitors)

SOFTWARE

Ashton Tate
dBase II ..... $ 399
Fox & Geller
Quickcode ..... $ 179
Financier
Personal Series ..... $ 129
Tax Series ..... $ 119
IUS
EasyWriter II ..... $ 205
EasySpeller II ..... $ 159
Accounts Receivable ..... $ 345
Accounts Payable ..... $ 345
General Ledger ..... $ 345
Inventory ..... $ 345
Order Entry ..... $ 345
Lifetree
Volkswriter ..... $ 120
Volkswriter International ..... $ Call
Lotus Development
1-2-3 (with tutorial on disk) ..... $ Call
Microsoft
Multiplan ..... $ 160
Flight Simulator ..... $ 30
Micropro
WordStar ..... $ 299
WordStar/MailMerge ..... $ 349
WordStar/MailMerge/Spellstar ..... $ 429
Sorcim
SuperCalc 2 ..... $ 160

APPLIED COMPUTER PRODUCTS INC.

1916 Welsh Rd. #6, Philadelphia, PA 19115
215-934-6990

Reader Service #205

TALL TREE SYSTEMS

presents:

LOADABLE DEVICE DRIVERS FOR DOS 2.00

Successors to the widely acclaimed JFORMAT for Dos 1.10

JETDRIVE **$40**

The only Electronic disk to work on any memory board. Contents restored after Ctrl-Alt-Del. Plus our famous JET (high-speed file transfer) program.

WINDRIVE **$40**

Available for most Winchester hard disk drive systems. Source code permits adaptation and customization. The only way to have unlimited drive expansion and disk-sharing.

JFORMAT-2 **$40**

The only way to go beyond 360 K on one diskette. Allows for 24 different formats up to 2.5MB size.

Don't forget:

JRAM **$800**

The only memory board which allows more than 640K bytes per system. 512K bytes controlled by a hardware pager. Includes the jetdrive program.

TALL TREE SYSTEMS
1036 Los Altos Avenue
Los Altos, CA 94022
(415) 941-5500

Reader Service #187

Btrieve™

A b-tree based record retrieval system designed to solve all your application's database needs.

- interfaces to BASIC, Pascal, COBOL and C
- multi-key access to any number of files
- duplicate and modifiable keys
- unlimited number of records per file
- built-in file integrity controls
- unsurpassed access speed
- efficient memory utilization

Compare Btrieve's capabilities to any record management or ISAM system available and we are convinced that you will select Btrieve. Write or call for details today. $145.00

Reader Service #173

SoftCraft Inc.

P.O. Box 9802, #590 Austin TX 78766
(512) 345-8380

Requires PC-DOS.
Btrieve is a trademark of SoftCraft, Inc.
PC-DOS is a trademark of International Business Machines Corp.

WORRIED?

Your data is in danger
without the powerful file recovery routines in the *Norton Utilities.*

Protect your data
with the essential file recovery routines

- *Recover erased files*
- *Recover from damaged diskettes*
- *Recover scrambled data*

Dozens of extra functions
included in the Norton Utilities

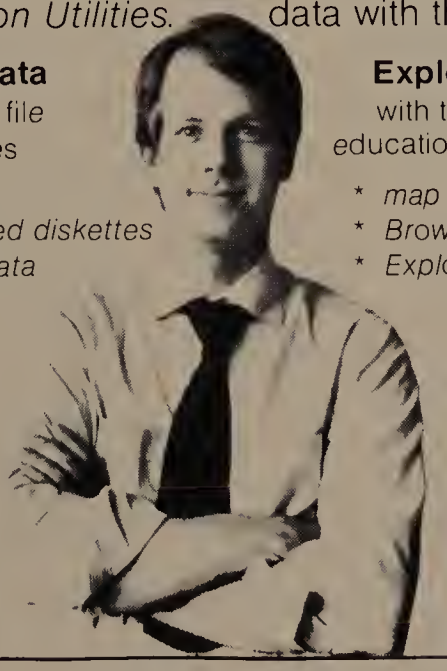
- *Disk labeling*
- *Screen control*
- *Sound, timing, file printing and more!*

SNOOPY?

Explore your disks
and learn the mysteries of disk data with the *Norton Utilities.*

Explore your disks
with the powerful and educational snooping tools

- *map disk formats*
- *Browse through all files*
- *Explore and patch all disks*



Works on **ALL** models of IBM
Works with **ALL** versions of DOS

TOP 30 SOFTALK POPULARITY WINNER!

"Nothing short of superb!" – PC Age

You can't afford to be without them!

"An industry standard!" – N.Y. PC User's Group

PHONE ORDERS
(213) 399-3948

The Norton Utilities Power Tools for the IBM/PC
Available from ComputerLand, other dealers and directly from me for $80:
Peter Norton 2210 Wilshire Blvd., # 186A, Santa Monica, CA 90403

Reader Service #127

COMPUMAIL

IBM PC & XT COMPLETE LINE

IBM PC 64K, Two disk drives 320K ea, Drive Controller & Color Graphics Card.
All for only $2599
IBM PC - XT also available

MONITORS

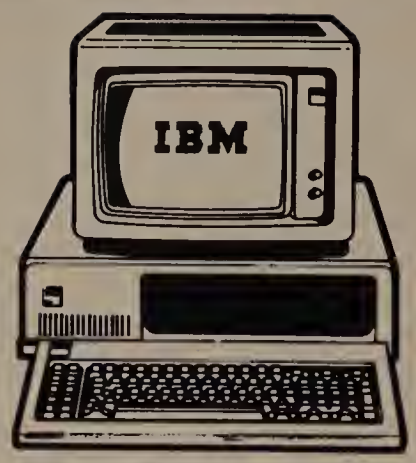
AMDEK
310-Green or Amber $179
Color I Plus . . . . . CALL
BMC
12″ Green or Amber $99
DYNAX
12″ Green or Amber 139
NEC MONITORS . . . . . CALL
PRINCTON GRAPHICS
RGB Color Monitor $549
QUADRAM
Quadchrome RGB Color $549
TAXAN
12″ Green or Amber $139
RGB Vision I with IBM Cable $379

PRINTERS: Dot Matrix & Letter Quality

BROTHER
HR-1 Parallel $739
HR-1 Serial $799
DYNAX
DX-15 Parallel Printer $549
(Same as Brother HR-15)
EPSON
RX-80 . . . . . $429
FX-80 . . . . . $549
NEC
8023 AC $499
SPINWRITER PRINTERS . . . . . **CALL**
OKIDATA
Microline 83A $690
Microline 92 . . . . . $549
QUME
Sprint 11 plus 40 cps $1499
IBM Connector Available

IBM MODULE CONVERSIONS

Z 80, 8060, 68000, 80286, 16032
UNIX/XENIX and PC VERSA CARD
Now in stock . . . . . Call for prices



FLOPPY DISK DRIVES

All drives are 500 KB Unformatted
CONTROL DATA - full height $269
MPI full height $269
QUENTIN - full height $269
QUEM TRAK 142 - slim line $269
SHUGART SA-455 slim line $269
TANDON full or half height $269
TEAC 55B slim line $269
96 TPI DRIVES . . . . . CALL

MULTI-FUNCTION BOARDS

ANATRON . . . . . CALL
AST RESEARCH
COMBOPLUS 64K $299
MEGAPLUS 64K $299
MAYNARD ELECTRONICS
Up to 640K + 3 Modules $199
BIG BLUE $459
MONTY CARLO CARD $349
PERSYST Time Spectrum $299
QUADRAM Quadboard $299
TECMAR 1st Mate $349
TALL TREE SYSTEMS
512K JRAM . . . . . $$699
1 MB JRAM Disk $1299

MONTHLY $PECIAL$

AST Megaplus 64K
with four functions $269
QUME TRAK 142 Slimine DS/DD
48 TPI Drive $229
FREE . . . . . WORDVISION
with purchase of IBM System

HARD DISK SYSTEMS

IBM PC with 128K, one floppy Drive (320K) Internal 10 MB Hard Disk, includes Controller, Power supply and software $3999

Call for other custom configurations.

HARD DISK DRIVES

DAVONG
10 MB Internal with Controller . . . $1599
21 MB Internal with Controller . . $2399
SANTA CLARA SYSTEMS
5 - 120 MB with Backup & Networking
. . . . . CALL
TECMAR
5 MB Removable Cartridges $1499

MODEMS

ANCHOR AUTOMATION Mark VI
300 Bd $199
HAYES Modems
Smartmodem 1200 . . . . . $529
Smartmodem 1200 Card . . . . . CALL
NOVATION SmartCat 1200Bd . . . $499

OTHER PRODUCTS FOR IBM

HERCULES Graphics Card $479
MAYNARD ELECTRONICS
Multifunction Card $89
5.25″ & 8″ Drive Controller $219
MICROSOFT MOUSE . . . . . CALL
PC MOUSE $269
ORCHID TECHNOLOGIES
Monochrome Graphics Adapter . CALL
PLANTRONICS ColorPlus $399
QUADRAM
Microfazer Printer Buffer $139
Quadlink Runs Apple Software
on IBM PC $549
TECMAR Graphics Master . . . . . CALL
USI Multidisplay Card . . . . . CALL

TO ORDER BY MAIL SEND:

- Your name and shipping address
- Daytime phone number
- California residents add 6% sales tax. L.A. County 6.5%
- Check or Credit Card number and expiration date (VISA or Mastercard)

Bank checks have shipping priority.

COMPUMAIL

18653 VENTURA BLVD., TARZANA, CA 91356

(213) 783-5000

Introducing UltraFile™: the most flexible management tool you'll ever need.

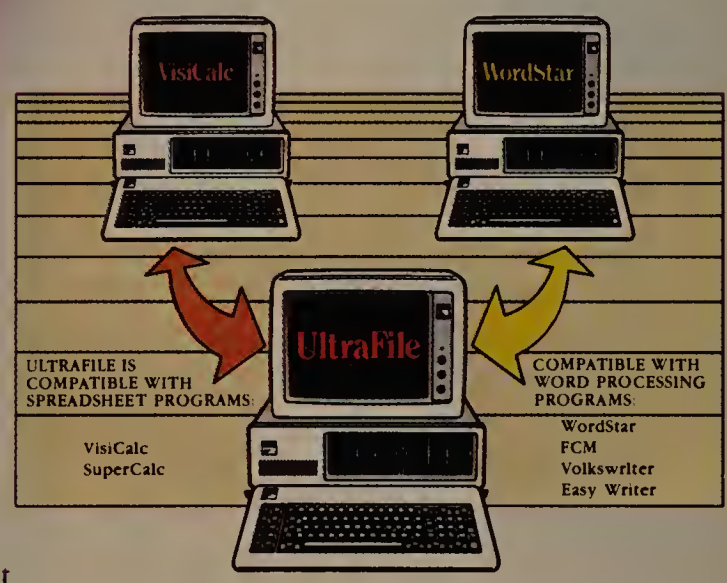


3 FOR THE PRICE OF 1.
File, Report, Graph in one easy program.
UltraFile: $195 complete.

ULTRAFILE ADDS NEW DIMENSIONS TO YOUR OTHER SOFTWARE PROGRAMS.

We taught UltraFile to talk to the most popular word processing and spreadsheet programs: VisiCalc, WordStar, SuperCalc, FCM, Volkswriter and Easy Writer. And that means you get the best of both worlds,

You can pull information from your "file" and put it into a letter or use it to do more complex calculations on a spreadsheet. And vice versa.



Have you ever misplaced an important piece of paper? Or had to work late just to put together a report for tomorrow morning's meeting? Or felt that you can't get at all the facts and figures that surround you?

It can be very frustrating. But it doesn't have to be.

Whether you need to process large amounts of information in business or just want to catalog your home library, UltraFile can do it for you. Because it's as powerful as it is easy to use.

UltraFile is the best reason there is for owning a computer.

SAVE COUNTLESS HOURS.

UltraFile can manage and organize your information in hundreds of different ways, no matter what your need. Here's one example:

You as sales manager know sales can be increased dramatically by concentrating on cities that have a population of at least 500,000 or an average income of at least $9,500. But which cities fit into those categories?

UltraFile can tell you. Instantly. UltraFile can pull the data out of a file of information and do calculations and even make projections.

Then, if you'd like to see the information on your screen or want a printout, just tell UltraFile in plain English and it will do it for you.

What's more, with UltraFile you can make revisions at any point without having to start all over.

TYING IT ALL TOGETHER.

UltraFile has a very easy-to-use, yet sophisticated and accurate "graphing" system. And it's fun, too.

Suppose you'd like to review information in graphic form to make a visual comparison. Just "point" to the kind of graph you want to see, whether it's 3-dimensional bar, circle or area graph (to name a few), and UltraFile does the rest.

One of the best parts about UltraFile's graphing capabilities is the ability to actually do calculations right on the screen. In seconds. Just pinpoint a spot anywhere on the graph, press a button and you automatically get a numerical readout. It's that easy.



The point is, UltraFile can easily and efficiently solve *your* information problems.

In fact, UltraFile gives you dozens of good reasons for owning a computer.

So stop by your Continental Software dealer. Or call us today to find out more about UltraFile and how it will help you get a grip on information.

UltraFile is available for the IBM PC and IBM PC XT.

UltraFile and FCM are registered trademarks of Continental Software. IBM PC/PC XT are registered trademarks of International Business Machines Corp. VisiCalc is a registered trademark of VisiCorp Personal Software. WordStar is a registered trademark of MicroPro International, Inc. SuperCalc is a registered trademark of Sorcim Corp. Easy Writer is a registered trademark of Information Unlimited Software, Inc. Volkswriter is a trademark of Lifetree Software, Inc.

ULTRAFILE: Get a grip on information.

Continental Software
A division of Arrays, Inc.

11223 South Hindry Avenue
Los Angeles, California 90045
213/417-8031, 213/417-3003

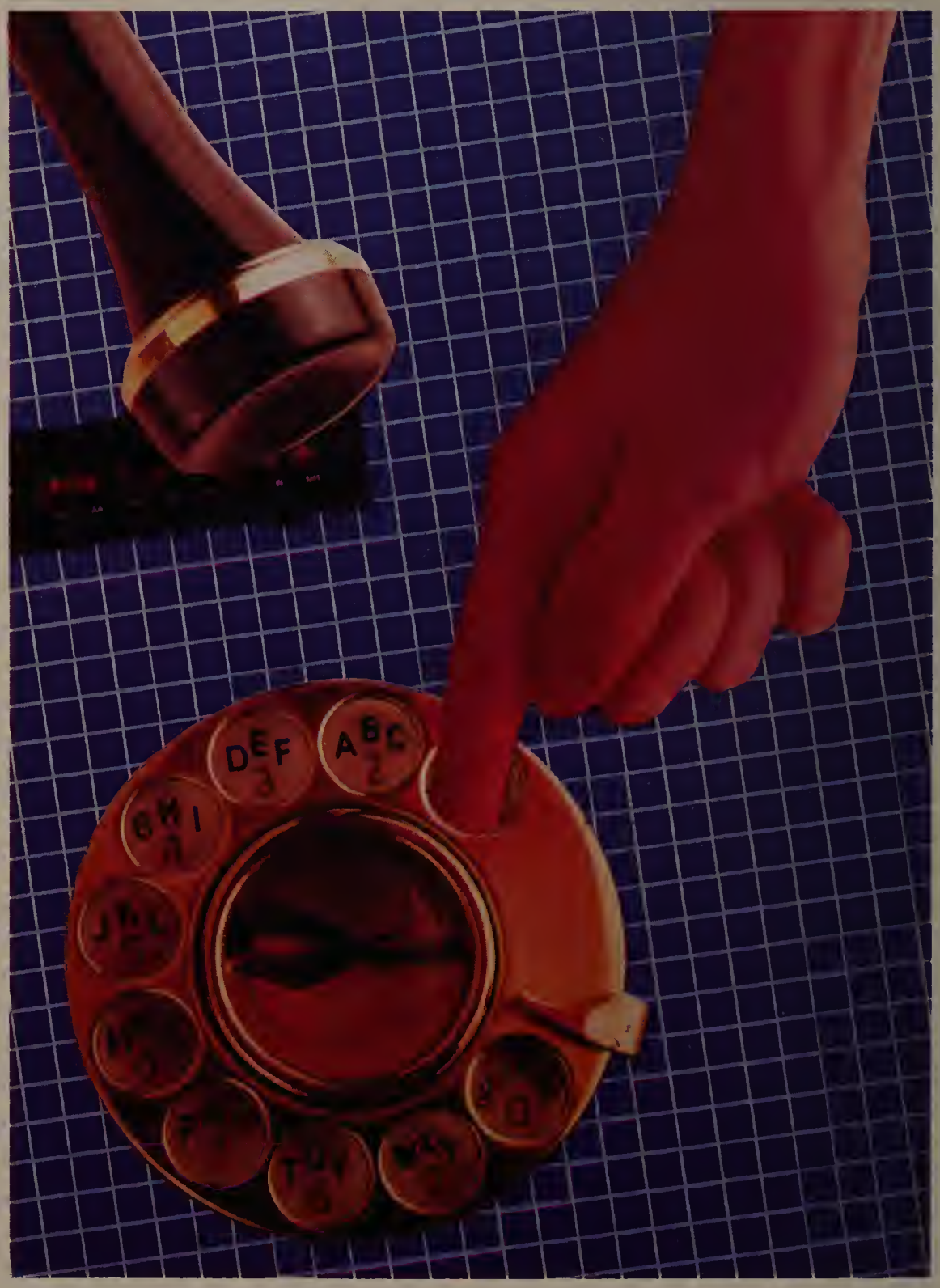
Reader Service #398

Smartmodem Gets Smarter

Use this simple program to turn your Hayes Smartmodem into a telephone dialing facility.

Burton L. Alperson

The popular Hayes Smartmodem has capabilities beyond those necessary for communication with other computers. To take advantage of some of these, I wrote PHONE.BAS (see Listing 1), a program that turns the modem into an automatic telephone dialing instrument. The program stores up to 40 names and phone numbers, and the latter may be stored with any necessary long-distance access codes such as those for SPRINT or MCI. To dial a stored number you need only enter the number's one- or two-digit code and press <ENTER>; other telephone numbers may be dialed by entering the number and pressing <ENTER>. PHONE.BAS also features one-key entry of SPRINT or MCI codes, one-key redial of the last number dialed, and automatic repeated redialing of the last number dialed.



Program Operation

Instructions for operating PHONE.BAS appear on the program's screen display (see Figure 1). Dial telephone numbers by typing the appropriate code or the number itself and then pressing <ENTER>. If you make a mistake, simply type an asterisk, press <ENTER>, and then reenter the code or the number. (Be-

cause of programming considerations that I'll explain later, you cannot use <Backspace> to correct errors.)

If you want to use an MCI or SPRINT access code, press <F1> and type in the area code and number you want to dial. You redial a number by pressing the R key. Automatic redialing is invoked by pressing the A key, and this routine is terminated while in progress when you strike any key. The automatic redialing routine makes up to 200 attempts to complete a call, but you can easily change this parameter to several million attempts (over 6 months of continuous dialing). Pressing the E key terminates the program, resets the modem to default status, and returns you to DOS.

The structure of PHONE.BAS is shown in the Warnier-Orr diagram accompanying "More on Warnier-Orrs." The program's most basic structure is simply initialize, get data, print screen, and operate. PHONE.BAS is written in BASIC, but the Warnier-Orr diagram is language independent, so implementing the diagram in most other high-level languages would be easy.

PHONE.BAS has been widely tested in Los Angeles. Telephone service in some areas of the country may be subject to local conditions such as slow dialing speed, so some adjustments may be necessary to make the program work satisfactorily in your area.

Customizing PHONE.BAS

The initialization routine (lines 1000 to 1050) contains some options for tailoring the program to your hardware configuration and local phone conditions. If your modem is attached to your second serial port, the reference in line 1010 should be changed to COM2:.

The statement S11 = 51 in line 1020 controls touch-tone dialing speed. The number 51 generates extremely fast dialing—51 milliseconds (msec) for both tones and intertone intervals. If you find that the program dials too fast for your telephone system, try eliminating the speed statement entirely; the Hayes modem will default to S11 = 70. If you still can't dial successfully, try parameters up to 255 msec.

You may also want to change the statement S7 = 10 in line 1020. If you like to dial while the telephone is in its cradle, this parameter gives you only 10 seconds to pick up the phone before the modem hangs up (picking up the phone overrides the modem's attempt to hang up). You can allow as much as 255 seconds for this parameter if you wish, but I recommend trying the program for a while before you change the value of the S7 register.

> The program stores up to 40 names and phone numbers.

The statement S0 = 0 in line 1020 should not be changed. This parameter guarantees that the modem will not enter the auto-answer mode. If the modem is in auto-answer while PHONE.BAS is running, anyone calling your number will be greeted by the squeal of the carrier tone.

PHONE.BAS assumes that you have touch-tone dialing in your area. If this is not the case, change the statement AT M0 DT in line 540 to AT M0 D, and change the statement AT M1 DT in lines 600 and 760 to AT M1 D.

The setting of the modem speaker reflects my personal preferences. The speaker is off on the first attempt to dial any number (M0 in line 540) to prevent the possibility of acoustic feedback between speaker and telephone. During redial and auto-redial operations, the speaker is turned on (M1 in lines 600 and 740). This arrangement enables you to move around the room and do other work while listening to the progress of your phone call. Use M1 to turn the speaker on and M0 to turn it off if your preferences are different from mine.

The Hayes modem was not designed to be used as a telephone dialer. Consequently the device does not recognize an answering party picking up the phone; it recognizes only a carrier tone generated by another modem. Because of the problems introduced by the lack of this capacity, I had to make some compromises in the auto-redial routine of PHONE.BAS.

One such compromise is that the frequency of attempts to redial a number must be controlled with fixed timing parameters rather than with a busy signal or an answering party. The timing parameters involved are J = 1 TO 2000 in line 770 (test for auto-redial termination for about 13.5 seconds), S7 = 10 in line 1020 (allow 10 seconds after dialing before hanging up), and S6 = 2 (wait 2 seconds for a dial tone before dialing). The S6 parameter is not explicitly stated in the program since it is the Hayes modem default. To change the S6 parameter to a 3-second wait, for example, insert the statement S6 = 3 into the string in line 1020. Do not change line 820, since the modem requires at least a 1-second delay to reset before redialing.

Entering Your Directory

You can store names and telephone numbers in the data statements in lines 3010-3410. This method is less elegant than storing data in external data files, as it eliminates the option of using built-in editing and appending routines. On the other hand, using data statements is appreciably faster than using external files. This is particularly true if the program is on a floppy disk rather than a hard or electronic disk. Since I typically want to load and run PHONE.BAS as quickly as possible, data statements were the appropriate choice; using

CALL:

E: Exit R: Redial A: AutoRedial H: Hang Up *To Correct Errors

CODE	NAME	CODE	NAME
1	AAA Auto Service	21	Plumber—Major Kramer
2	ABC Premiums	22	Restaurant—Anna Maria
3	Adray—Wilshire	23	Restaurant—Any Restaurant
4	Allstate Insurance—Greg Ray	24	Restaurant—Paul Bhalla's
5	American Home Security	25	Restaurant—The Egg and the Eye
6	Ametron	26	Restaurant—Green Jade
7	Amica Insurance	27	Restaurant—Mon Grenier
8	Audio Mart—John Romero	28	Restaurant—Sea Food Bay
9	Computer—Bob Rice	29	Restaurant—Sorrentino's
10	Computer—ComputerLand Glendale	30	Restaurant—Supreme Pizza
11	Computer—ComputerLand Pasadena	31	Restaurant—Sushi Fune
12	Computer—IBM Product Center—BH	32	Restaurant—Tokyo Kaikan
13	CSU Bookstore	33	Shiatsu—Jean
14	CSU Library—Reference	34	Sparkletts Water
15	Dentist—UCLA Clinic	35	Taxes
16	IBM Selectric Service (Zone 0931)	36	Zen Carpentry—Bill Jordan
17	INMAC—Mark Brown	37	
18	Mazda Service (Savage)	38	
19	MD—Hamm	39	
20	PC World—Kearney Rietmann	40	

TIME: 12:26:11

MCI: F1 + Area Code + Number. UNLISTED NUMBERS: Type number instead of code.

your computer to dial your telephone doesn't make sense if you can do it faster by hand.

An MCI or SPRINT code may be inserted in line 3000. MCI, for example, requires that you dial a telephone access number, wait for a dial tone, then dial an account code before you can dial your number. If your access number were 555-5555 and your account number were 12345, line 3000 would be

```
3000 KEY 1,"5555555,,,12345"
```

Each comma causes the modem to pause for 2 seconds to wait for a dial tone before entering the account number. The hyphen is not included in the access number because BASIC imposes a 15-character limit on strings assigned to function keys.

If your access code requires more than 15 characters (including commas for timing), you might get around the problem by using the S8 register of the Hayes modem. This register controls the duration of the delay generated by a comma. For example, if line 1020 were written as

```
1020 PRINT #1, "AT S11=51 S0=0 S7=10
     S8=6"
```

then line 3000 could be written as

```
3000 KEY 1, "5555555,12345"
```

If you have several long-distance codes, they can be assigned to function keys 2 through 10 in similar fashion, and appropriate references can be added to the prompt in line 2030.

You can make directory entries for local, long-distance, and long-distance SPRINT or MCI numbers. The following entries are all acceptable.

```
3010 DATA "PHILISTINE, A.","999-9999"
3020 DATA "REAGAN, R.","1 (202) 999-9999"
3030 DATA "HUN, A.","555-5555,,,12345 (999)
     999-9999"
```

Keyboard Entry Routine

Most of the code in PHONE.BAS is straightforward and requires little explanation. However, the keyboard entry routine uses some strategies and BASIC operations that may be unfamiliar to many programmers (i.e., dummy variables, case structures, INKEY$, RIGHT$, LEN, LINE INPUT, VAL, and ON...GOTO). I used these techniques to minimize the number of keystrokes required for data entry. The keyboard entry routine has to recognize whether the input is a single-character command that begins an operation, an asterisk indicating a correction, the first digit of a code representing a number to be dialed, or the first character of an

```
1 ' Telephone dialing program for 300 or 1200 baud Hayes Smartmodem.
2 ' Written by Burton L. Alperson

10 GOSUB 1000
20 GOSUB 3000
30 GOSUB 2000

100 ACTION%=0
110 ENTRY$=INKEY$:LOCATE 24,65,0:PRINT"TIME: "+TIME$;
    :LOCATE 1,1:PRINT"CALL:";
120 IF ENTRY$="" THEN 110

200 IF ENTRY$="E" OR ENTRY$="e" THEN ACTION%=1
210 IF ENTRY$="H" OR ENTRY$="h" THEN ACTION%=2
220 IF ENTRY$="R" OR ENTRY$="r" THEN ACTION%=3
230 IF ENTRY$="A" OR ENTRY$="a" THEN ACTION%=4
240 IF ACTION%=0 THEN 500
250 ON ACTION% GOTO 300,400,600,700

300 PRINT #1, "AT Z":CLOSE:COLOR 7,0:CLS:SYSTEM

400 PRINT #1,"AT H,":LOCATE 1,1:PRINT STRING$(79,32):GOTO 100

500 LOCATE 1,7:PRINT ENTRY$;:LINE INPUT DUMMY$:DUMMY$=ENTRY$+DUMMY$
510 IF RIGHT$(DUMMY$,1)="*" THEN LOCATE 1,1:PRINT STRING$(79,32):GOTO 100
520 IF LEN(DUMMY$)<3 THEN DIAL$=NUMBER$(VAL(DUMMY$)):LASTNUM$=DIAL$
530 IF LEN(DUMMY$)>2 THEN DIAL$=DUMMY$:LASTNUM$=DIAL$
540 PRINT #1, "AT M0 DT"+DIAL$
550 LOCATE 1,1: PRINT STRING$(79,32)
560 LOCATE 1,65-LEN(DIAL$):PRINT "NUMBER DIALED: ";DIAL$;: GOTO 100

600 PRINT #1, "AT M1 DT"+LASTNUM$
610 LOCATE 1,1:  PRINT STRING$(79,32)
620 LOCATE 1,69-LEN(LASTNUM$):  PRINT "REDIALING: ";LASTNUM$;:  GOTO 100

700 FOR I=1 TO 200
710 COLOR 18,0:LOCATE 24,65:PRINT"ATTEMPT NO ";
720 COLOR 15,0:PRINT USING"###";I;
730 COLOR 18,0:LOCATE 1,1:PRINT STRING$(79,32);
740 LOCATE 1,1:PRINT  "AUTO REDIAL FOR ";:COLOR 15,0:PRINT LASTNUM$;
750 LOCATE 1,45:COLOR 15,0:PRINT "STRIKE ANY KEY TO ABORT AUTO REDIAL"
760 PRINT #1, "AT M1 DT"+LASTNUM$
770 FOR J=1 TO 2000
780 R$=INKEY$
790 IF R$<>"" THEN LOCATE 1,1:PRINT #1,"ATH":PRINT STRING$(79,32);:GOTO 100
800 NEXT J
810 PRINT #1, "ATH"
820 FOR Y=1 TO 833:NEXT Y
830 NEXT I
840 LOCATE 1,1:PRINT STRING$(79,32);:GOTO 100
1000 KEY OFF
1010 OPEN "COM1:" AS #1
1020 PRINT #1, "AT S11=51 S0=0 S7=10"
1030 DIM NUMBER$(40),PARTY$(40)
1040 CLS
1050 RETURN
```

(continues)

Listing 1: PHONE.BAS

```
2000 CR$=CHR$(17)+CHR$(196)+CHR$(217)
2010 LOCATE 2,1:COLOR 0,7:PRINT "E: Exit    R: Redial";
2020 PRINT "    A: AutoRedial    H: Hang Up      *"+CR$+"
     To Correct Errors";
2030 LOCATE 25,1:PRINT " MCI: F1 + Area Code + Number.  ";
2040 PRINT "UNLISTED NUMBERS: Type number instead of code.";:COLOR 7,0
2050 COLOR 9,0:LOCATE 3,1: PRINT "CODE  NAME";STRING$(30,32);"CODE  NAME";
2060 PRINT STRING$(29,32);:COLOR 7,0
2070 FOR I=1 TO 20
2080 LOCATE I+3,1:PRINT USING "####";I;:PRINT "  ";:PRINT PARTY$(I);
2090 LOCATE I+3,41:PRINT USING "####";I+20;:PRINT "  ";:PRINT PARTY$(I+20);
2100 NEXT I
2110 COLOR 15,0
2120 RETURN

3000 KEY 1,"INSERT MCI OR SPRINT CODES HERE"
3005 FOR I=1 TO 40:READ PARTY$(I),NUMBER$(I):NEXT I
3010 DATA "INSERT NAME OF PARTY #1","INSERT PHONE NUMBER OF PARTY #1"
3020 DATA "INSERT NAME OF PARTY #2","INSERT PHONE NUMBER OF PARTY #2"
3030 DATA "",""
3040 DATA "",""
3050 DATA "",""
     .
     .
     .
[NOTE:  There  must  be  40 lines of data statements to make the  program
run properly.   If  you do not have 40 entries for your phone directory,
use  the format shown in lines 3030-3050 and 3380-3400 for blank data
statements.]
     .
     .
     .
3380 DATA "",""
3390 DATA "",""
3400 DATA "",""
3410 RETURN
```

Listing 1 *(continued)*

actual telephone number. If the entry is the first digit of a code, the rest of the code must be appended to it and the code must be converted to a telephone number. If the entry is the first digit of a telephone number, the rest of the number must be appended to it.

Line 110 traps the first keystroke and defines it as the string constant ENTRY$. If ENTRY$ is any of the single-character commands, the program takes immediate action (lines 200 to 230). If ENTRY$ fails all the tests of lines 200 to 230, it must be a code, a telephone number, or an instruction to correct an entry. Once this has been determined, the rest of the keyboard input is appended to ENTRY$ and the concatenated string is defined as DUMMY$ (line 500). DUMMY$ is then tested for an error-correction instruction (line 510). If DUMMY$ does not have an error-correction symbol as its right-most character, the program tests the string's length. If DUMMY$ is less than 3 characters long, it must be a code; the number the code represents is retrieved and defined as the number to be dialed (line 520). If DUMMY$ is more than 2 characters long, it must be a telephone number; it is defined as the number to be dialed (line 530).

This routine works well, but using <Backspace> to correct errors disrupts the logic and produces unpredictable results. Instead, you have to use the asterisk to signal correction of input errors.

A Final Word

Like most programs, PHONE.BAS will only be of use to you if it fits your needs and is well integrated into your system. The major considerations for a program like PHONE.BAS are that it be quick and convenient. One way to speed up access to PHONE.BAS is to use a macro-processing program like *ProKey* or *Keynote* to assign command sequences to a single key. In my own system, for example, three versions of PHONE.BAS can be called up quickly by pressing <F5>, <Alt>-<F5>, or <Shift>-<F5>; the commands assigned to these keys are BASICA PHONE-P, BASICA PHONE-B, and BASICA PHONE-E. PHONE-P and PHONE-B are two programs that have personal directories, and PHONE-B contains a directory of numbers that I need for business.

While the usefulness of this dialing program is currently limited to times when your computer isn't otherwise occupied, multitasking and concurrent operation on the PC aren't very far away. When you can press a key and instantly switch operations, and then press another key and resume where you left off, the issue of tying up the computer or interrupting a process will no longer be of concern.

If you use floppy disks, the location of PHONE.BAS on the disk is a critical factor in determining how fast the program can be invoked. If loading speed is important to you, BASICA.COM and PHONE.BAS should be among the first programs you copy onto the disk.

Paying attention to system considerations increases the usefulness of many programs. The kind of system integration described above has made PHONE.BAS one of the most frequently used programs in my library.

More on Warnier-Orrs

Warnier-Orr diagrams were first developed by the French computer scientist and logician Jean Dominique Warnier as a part of his efforts to develop a completely automatic procedure for designing computer programs based on mathematical set theory. The techniques Warnier developed are very useful for business applications such as data base management and financial programs. They are less useful for scientific applications, although the procedure can still save time and effort by eliminating superfluous programming.

Warnier's techniques were improved and refined by Ken Orr of the United States. In addition to several conventions that he added to Warnier's diagrams, Orr developed a design technique called Structured Systems Design that is one of the most powerful and elegant methods in the so-called top-down structured programming revolution.

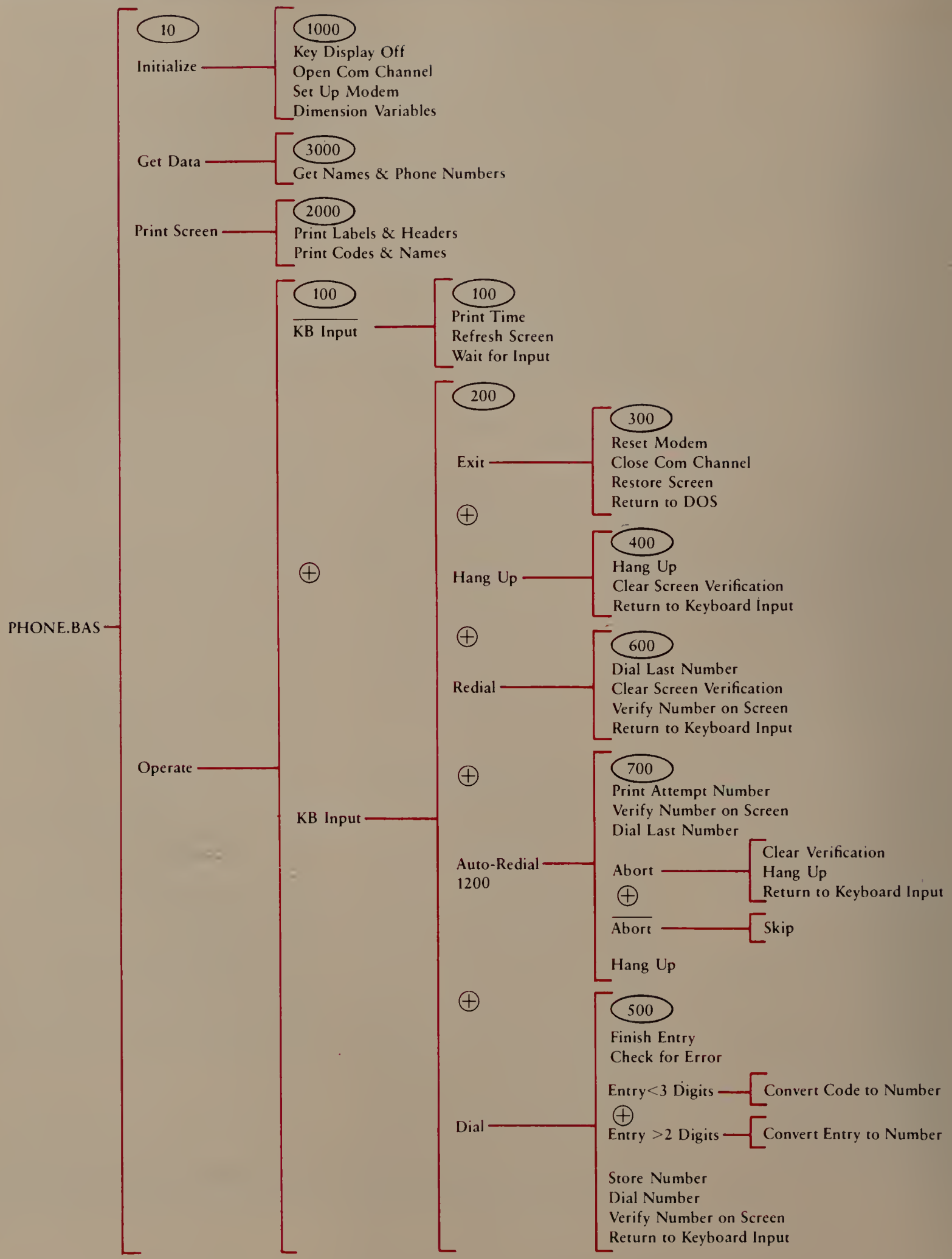
Warnier-Orr diagrams contain an enormous amount of information in a compact format. Labels are descriptive titles for operations to be performed (such as initialize and print screen). A line over a label means that an event has not taken place or an operation is not to be performed. A plus sign is an inclusive "or" (print to the screen, to the printer, or to both). A circled plus sign is an exclusive "or" (abort the routine or don't abort the routine). Repetition is indicated by 1,*n* where *n* is the maximum number of repetitions. Orr developed additional conventions (e.g., for representing mathematical operations), but the set described above serves our purposes.

The beauty of this procedure is that a single diagram can immediately tell you the what, when, why, and how of a complete program. Reading the label informs you what function each operation performs. Reading the diagram from top to bottom tells you when operations are performed; reading the diagram from right to left tells you the purpose of each step; and reading the diagram from left to right tells you how to do things.

In the Warnier-Orr diagram of PHONE.BAS, for example, the sequence of events is initialize, get data, print screen, and finally operate. Reading from left to right, you can see that to initialize you must turn the key display off, open a communications channel, set up the modem, and then dimension your variables. If you need to know why you are printing the time, refreshing the screen, and waiting for input, by reading from right to left you can see it's because there has been no keyboard input.

Notice that up to this point nothing has been said about BASIC or any other programming language. Warnier-Orr diagrams

(continues)



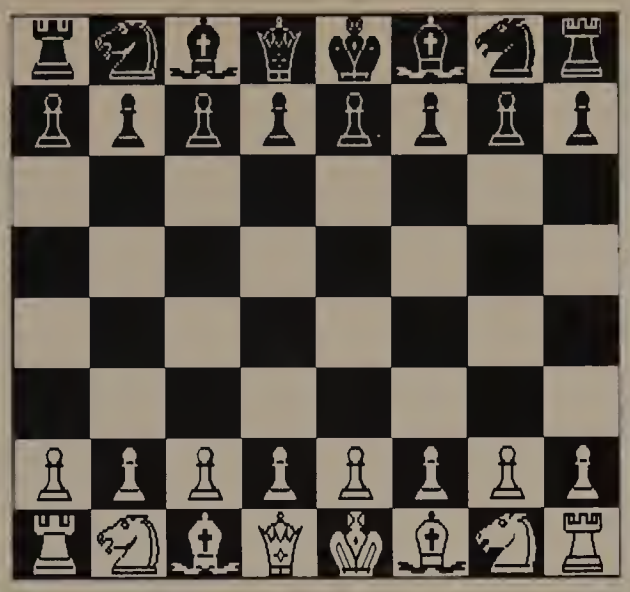
Warnier-Orr diagram for PHONE.BAS

are language independent. They show the structure of a program and can be implemented in any language.

Strictly speaking, the numbers in the ovals in this diagram are not part of a Warnier-Orr diagram; they are part of what Orr calls the physical implementation of the diagram. These are the line numbers of PHONE.BAS. The initialization routine, for example, begins in line 1000 of Listing 1, the auto-redial routine begins in line 700, and control of the basic structure of PHONE.BAS begins in line 10.

A few experiences with Warnier-Orr programming can produce something akin to a religious conversion. I wrote PHONE.BAS before I knew of this approach to programming, so I decided to revise the program for publication by using Warnier-Orr techniques. Although I was sure I had originally written tight, nonredundant code, application of the Warnier-Orr techniques produced a 23 percent reduction in active program size. An additional benefit is that the program runs better and faster than before.

Many introductory programming texts solemnly inform you that programming should begin with flow charts. Few experienced programmers bother with them, however; they are most frequently used only as expedient devices to impress management. Unlike flow charts, Warnier-Orr diagrams are genuine design tools that can dramatically reduce programming time and effort and improve programs.



BLUEBUSH™

chess

For the IBM PC and PC-XT

An elegantly designed game that's a challenge at any level of play, from novice through expert. It will play itself, display play lists, check moves for legality and give you help whenever you want it—even select the best move for you.

You can play black or white, set up and start from any board position, make en passant pawn captures, take back unwanted moves. And you can change display color, sides, board setup or play level (7 skill levels, plus postal chess) any time you want during a game.

In graphics mode the chessboard fills the screen with attractive U.S. Chess Federation standard pieces. On IBM Monochrome monitors, the full-screen display offers easily distinguished colors and pieces. The program automatically determines which monitor is available, and gives a choice if you have both.

Cursor piece movement, superb graphics, sound, and simple menu prompts make it easy for anyone to be playing within minutes, and a continuing pleasure for even the most experienced players.

$49.95. Sturdy plastic diskette storage box, included, makes an easel when it's opened; 16-page Bluebush Chess documentation booklet fits neatly inside. 64K memory and one disk drive, either single or double-sided required. Contact your local dealer or order directly (please add $2.00 postage and handling; Calif. residents add 6.5% sales tax) from Bluebush Incorporated, P.O. Box 3585, Santa Clara, CA 95055. Telephone toll-free, 800-241-1994; in California, 800-241-1989. Credit card orders welcome.



Bluebush Chess is a trademark of Bluebush Incorporated.
IBM is a trademark of International Business Machines Corp.



THE COMPUTER'S HEARTBEAT

The Universal 5¼" Diskettes.

NEW - Pulse I - 48 TPI

Pulse II - 96 TPI Up to 1.0 MB.

NEW - Superior Magnetics for a LIFETIME.

NEW - Packaging - 2, 6, and 10 Pacs.

FOR USE WITH ALL PC's

brown disc manufacturing, inc.

1015 Garden of the Gods Road Colorado Springs, Co 80907

(800) 654-4871 TELEX 450827

We're Driving the Drive Market.

Reader Service #346

TWICE AS MUCH SPEED. 100% MORE CORRESPONDENCE.

To get as much from an IBM printer, you'd have to buy two.

Compare. Compare. Compare performance characteristics between Okidata's outstanding ML 92 and 93 printers and the IBM 5152 Model 2 printer, and you'll quickly find there is no comparison. For a few dollars more, the Okidata ML 92 and 93 offer three high speed modes: 160 cps bidirectional data processing (complete with short line seeking logic); 80 cps emphasized and enhanced printing for drafts; 40 cps for high resolution correspondence quality printing and other business communications. And complete graphics capabilities that are over 50% faster than IBM.

The IBM 5152, on the other hand, offers 80 cps data processing and no correspondence quality whatsoever. Your choice? An 80-column ML 92 or its 136-column partner, the ML 93, for all your DP, graphics and correspondence needs. Fast. Or, an IBM 5152 and something else (a daisywheel, perhaps?). Without the speed you need.

Plug 'n Play Makes It Easy. Because we've created the Okidata Plug 'n Play interface kit, your Okidata printer is perfectly compatible with your IBM computer and software without modifications. Here's how simple it is:

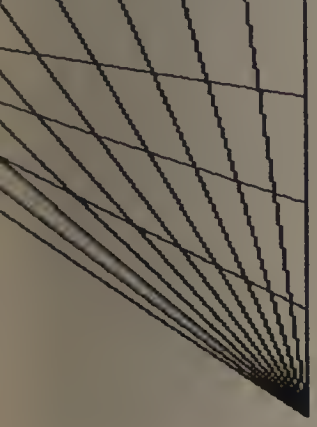
- Two replacement PROMs adapt the ML 92 and 93 to all IBM commands.
- An optional cable links computer and printer to provide instantly-responsive 160 cps bidirectional speed for DP, 80 cps for drafts, or 40 cps for correspondence quality.

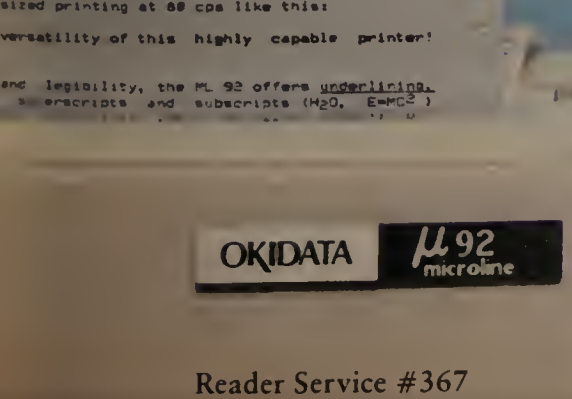
That's that. In addition, you get Okidata's built-in printer reliability in the form of our long-life, 9-pin print head warranted for one full year, and a 4000 hour MTBF and 15 minute MTTR rating. Plus a 90-day warranty on parts and labor. And a warranty claim rate that's a leader in the industry: less than ½%.

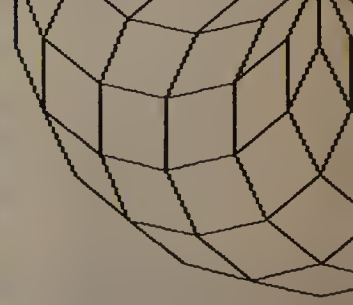
Liberate Your Computer. Don't limit the power of your IBM PC with a printer that can't keep up. Ask for a demonstration of the ML 92/93 and Plug 'n Play winning combination.* Phone 1-800-OKIDATA (in NJ, 609-235-2600) for the Okidata dealer nearest you.

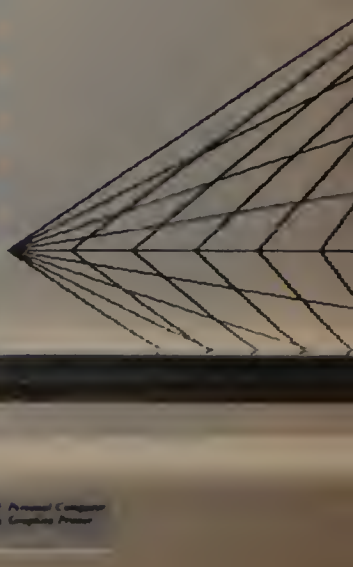
OKIDATA
Mt Laurel NJ 08051
A subsidiary of Oki Electric Industry Company Ltd

*12 cpi and downline loadable character sets are not available with Plug 'n Play.









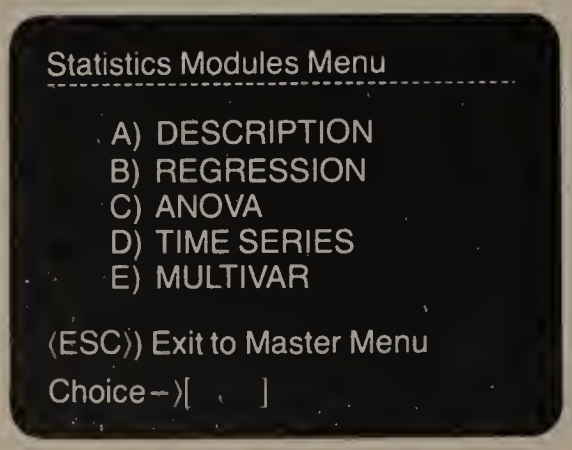
Reader Service #367

Statpro™

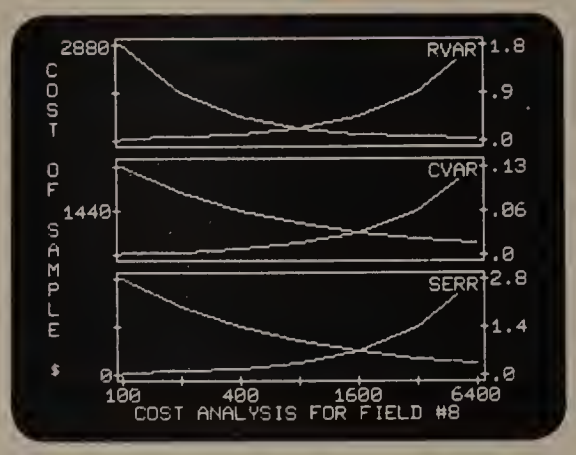
The most comprehensive statistics and graphics ever developed for and sophisticated database workstation the personal computer.

Years of research, development, and field testing have resulted in the most extensive statistics and graphics database program specifically designed for the personal computing environment. STATPRO™ provides the data analysis capabilities and flexibility previously available only on a large computer. Researchers, business professionals, and other data analysts will welcome the breadth yet simplicity of this program! STATPRO requires no previous computer experience, no special command language. Single keystrokes access all of the data manipulation, statistics, and graphics power of STATPRO.

STATPRO allows easy access to its extensive numerical data capabilities.
The strength of STATPRO is found in the functions of its user friendly, menu-driven database. You can easily learn to enter and edit, manipulate, transform, and print out data. STATPRO's searching capabilities allow these functions to be performed on all your data or a user defined subset of your data.



Transformations and over 400 conversions are available. You can place the results of these transformations into the same field or any other field in STATPRO's database.



STATPRO offers a comprehensive collection of statistical procedures.
The statistics component of STATPRO contains a multitude of procedures, grouped into the following modules:

Descriptive: Contingency analysis, cross tabulation, normality tests; descriptive, comparative, range and non-parametric statistics.

Regression: Linear, non-linear, stepwise, and multiple regressions; residual analysis and statistical matrices.

Analysis of Variance: Single and nested classifications, two and three way equal and unequal sample size and non-parametric ANOVA.

Time Series: Moving averages, multi-stage least squares, fitted polynomials and trig functions, additive and multiply forecasting.

Multivariate: Principal components, factor, orthogonal factor, oblique factor, pair-weighted cluster, discriminant function, multiple contingency, and canonical correlation analysis.

STATPRO provides graphic representation of your data in minutes.
STATPRO graphics plot *all* the results of your STATPRO statistical analyses including scatter, triangle regression, and box plots; pie-charts, histograms, and dendograms. Further, with STATPRO you can custom edit with any of four character sets from the keyboard. You can also edit using paddles, joystick or special graphics commands. Mix text with data fields. Place multiple plots on each screen. Define your axis limits.

You can save your graphics on a disk for a multiple color "slide show" presentation, or print them out through a variety of compatible printers.

STATPRO documentation wraps up the package.
Although STATPRO software is essentially self-documenting, complete print documentation is provided. This includes a walk-through Introductory Tutorial, a Menu Chart, and a comprehensive User's Guide for each STATPRO component.

STATPRO currently runs on all versions of the Apple® II personal computers. It will be available for the IBM® PC in September.

To find out more about **Statpro: The Statistics and Graphics Database Workstation**, contact your local dealer, or

Call us toll-free at

800-322-2208

In Massachusetts call (617) 423-0420.

You can also call us toll-free for information on corporate purchase through our National Account Program.

Wadsworth Electronic Publishing Company
Statler Office Building
20 Park Plaza, Boston, MA 02116

STATPRO is a trademark of Wadsworth Electronic Publishing Company. Apple is a registered trademark of Apple Computer, Inc. IBM is a registered trademark of International Business Machines, Corp.

Reader Service #311

Now For Your IBM!

MAXI CRAS

THE CHECK REGISTER ACCOUNTING SYSTEM FOR PERSONAL AND SMALL BUSINESS USE

WHAT IS MAXI C.R.A.S.?

Maxi C.R.A.S. is THE computerized check writing and record keeping system for small business and personal use. But don't take our word for it! Compare it with any other system available for your computer. Read through our manual, and look at the printed reports that Maxi C.R.A.S. produces. Then talk to one of the thousands of people who use it. We're sure you'll agree — Maxi C.R.A.S. is the most versatile system available.

WHO CAN USE IT?

Almost anyone! Maxi C.R.A.S. is designed for people interested in gaining more control over where their money goes. Maxi C.R.A.S. is powerful enough for small business use, yet so easy to use that it's ideal for your personal finances too. It takes the work out of everything associated with a checking account: printing checks, balancing your account, reconciling bank statements, and keeping extremely accurate records. And those accurate records are delivered in the format required for income tax preparation!

BUT WHAT MAKES IT DIFFERENT FROM ALL THE REST?

We're glad you asked! Maxi C.R.A.S. lets you write checks by hand, or it will print them for you automatically. It handles a virtually unlimited number of transactions per month. And to keep track of all that financial activity, Maxi C.R.A.S. supports up to 223 user-defined income and expense accounts. Any transaction can be distributed between one or even all 223 accounts.

The Maxi C.R.A.S. database keeps track of up to 75 addresses, and automatically prints them on the correct checks. Use window envelopes and save the work of addressing envelopes.

I'M INTERESTED. TELL ME MORE.

Organizing the data is just half the story. Maxi C.R.A.S. prints six detailed reports and statements:

Check Register
Check Register Notes
Income and Expense Subtotals
Individual Account Activity Report
Account Distribution Statement (audit trail)
Checkbook Reconciliation Statement

BUT WILL IT WORK WITH MY SPREADSHEET PROGRAM?

For detailed forecasting, budgeting, and analysis, Maxi C.R.A.S. interfaces EASILY with VisiCalc™, Multiplan, 1-2-3, Peachtext 5000, and Supercalc™!

TELL ME ABOUT ITS OTHER FEATURES.

- Easy-to-use Data Entry routine — saves time and eliminates errors. You don't need to be a computer expert to become a Maxi C.R.A.S. expert!
- Notes option can be used to flag tax-deductible items.
- Checkbook balance is constantly updated and instantly accessible. No more embarrassing overdrafts!
- Compatible with hard-drive systems, including XT.
- Fast and easy reconciliation of check register with bank statement.
- Complete, easy-to-understand User's Manual.

Maxi C.R.A.S. — an indispensible tool for managing money most effectively.

THEY LIKED IT!

"We never thought we'd see the day, but here it is. We have published a review of a check register program that made us want to buy one."

Reprinted from a review of Maxi CRAS in the February 1983 issue of Creative Computing magazine. Copyright 1983 Ahl Publishing Company.

WE INVITE YOU TO COMPARE!

Compare Maxi CRAS with any other system available. We're sure you'll find Maxi CRAS to be the most versatile, easy-to-use check register system available — at any price.

Maxi CRAS will run on an IBM PC or XT with an 80-column display and either two floppy disk drives or one fixed disk.

1-800-327-7172

Visit your local dealer or call us toll-free *today*.
(Dealer inquiries are invited!)

THE BUSINESS DIVISION
PO BOX 3435 • LONGWOOD, FL 32750
(305) 862-6917

205



A Subsidiary of Scott Adams, Inc.

Reader Service #401

Unbeatable Prices

Printers

NEC
NEC 8023A ..... $ 439
NEC 3530 ..... $1599
NEC 7710 ..... $2059
NEC 7730 ..... $2059
NEC 3550 ..... $1899

Diablo
Diablo 620R (25CPS) ..... $ 949
Diablo 630R (40CPS) $1729
Diablo 630KSR (40CPS) $2429

Epson
FX80 ..... $ 599
FX100FT ..... $ 799

Smith Corona
TP-1 Parallel ..... $ 499

Okidata
ML82A ..... $ 419
ML83A ..... $ 649
ML84P ..... $ 979
ML84S $1089
ML92 ..... $ 489
ML93 ..... $ 869

IDS
Microprism 80 ..... $ 549
Prism 132 ..... $1399
(w/Sheetfeed & Graphics)
Prism 132 ..... $1589
(w/Sheetfeed, Graphics & Color
Prism to IBM Cable ..... $ 48

Citoh
8510 Prowriter ..... $ 362
F10 Starwriter $1349
F10 Printmaster $1599

Mannesmann Tally
MT 160L ..... $ 749
MT 1802 (Parallel) $1559
MT 1805 (Serial) $1559

Gemini
Gemini 10 ..... $ 319
Gemini 15 ..... $ 479

Qume
Qume Sprint 11 + ... $1349
Tractor Feed ..... $ 175
Printer Interface ..... $ 75

We Carry the Full Line of AST Research and Quadram Multi-Function Boards

CALL FOR BEST PRICING

New Products

★ ★ Corona Desktop Computer ★ ★
IBM COMPATIBLE Includes 2 320K drives, 128 K memory. Graphics serial/parallel ports, high resolution monitor, MS DOS, GW BASIC Multimate wordprocessing, PC TUTOR
$2995

★ ★ Corona Desktop Computer ★ ★
Same as above with one 320K floppy and one 10 megabyte hard drive.
$4795

★ ★ Corona Portable Computer ★ ★
IBM compatible two 320 drives. 128K memory. Graphics, serial parallel ports, hi-resolution monitor, MS DOS, Multimate wordprocessing, PC TUTOR, GW BASIC
$2795

★ ★ Corona Portable Computer ★ ★
With one 320 drive and 10MG HARD DRIVE
$5090

★ ★ Specials of the Month ★ ★

Hayes Smartmoden 1200 B w/Smartcom II Complete plug-in system $399
Verbatim Disks (S/D w/Library Case) ..... $ 27
Box of Maxell Disks (D/D) ..... $ 39
Flip n'Sort Diskette Box (Holds 50 Disks) ..... $ 21
USI Amber Monitor $149
Elephant Disks (D/D) ..... $ 30
Microsoft Flight Simulator ..... $ 34
Signalman MARK VI Modem w/Software $179

COMPUTER OUTLET

1095 E. Twain (702) 796-0296
Las Vegas, Nevada 89109

Call Toll Free
1-800-634-6766
Order Line Only

Information & Order Inquiries (702) 369-5523

We accept VISA and MasterCard
Mon. — Fri. 8 A.M. to 6 P.M. — Sat. 9 A.M. to 6 P.M.
Dealers' Inquiries Invited

Monitors

Amdek
Color II ..... $ 679
Color III ..... $ 399
Color IV (RGB Analog Input) $1029
Amdisk 3 ..... $ 729
Amplot ..... $ 769
Amdek V310 Green ..... $ 179

NEC
NEC JB 1201M ..... $ 169

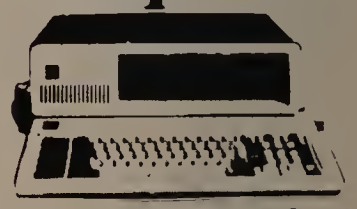
Quadram Quadchrome
- Hi-Res RGB Monitor
- Non-Glare Screen
- 690 x 240 Resolution

$549

Peripherals

Kraft Joystick 45
TG Joystick ..... $ 39
TG Trackball ..... $ 39
Microsoft 64K Ramcard ..... $ 239
Microsoft 256K Ramcard ..... $ 589
Hayes Smartmodem 300 ..... $ 209
Hayes Smartmodem 1200 ..... $ 499
Hayes Smartcom II Terminal Pk. ..... $ 72
Anchor Automation Mark VI Modem ..... $ 179
Quadram Microfazer w/Power Supply ..... $ 149
Trackball ..... $ 59
Analog Joystick ..... $ 49
IBM Interface Card ..... $ 45
Versawriter Graphics Tablet ..... $ 239

NEWLY ARRIVED IBM Personal Computer



Includes 64K IBM-PC with two 320 KB floppy disk drives, controller color graphics card, monochrome monitor

$2839

ORDERING INFORMATION AND TERMS:
For fast delivery send cashier checks, money orders or direct bank wire transfers. Personal and company checks allow 3 weeks to clear. C.O.D. orders ($3.00 minimum) and 1% of all orders over $300. School purchase orders welcome. Prices reflect a cash discount only and are subject to change. Please enclose your phone number with any orders.
SHIPPING: Software ($2.50 minimum). Shipping — Hardware (please call). Foreign orders APO & FPO orders — $10 minimum and 15% of all orders over $100. Nevada residents add 5 3/4% sales tax. All goods are new and include factory warranty. Due to our low prices, all sales are final. All returns must have a return authorization number. Call 702-369-5523 to obtain one before returning goods for replacement. All returned merchandise is subject to a restocking fee and must come with their original packaging in order to be accepted. NO returns permitted after 21 days from shipping date.

Fantastic Selection

Business & Utilities

Advanced Operating Systems
The Programmer $129

Applied Software
Versaform $249

Ashton Tate
dBase II (CP/M 86) ..... $ 419
dBase II (MS DOS) ..... $ 419
The Financial Planner ..... $ 419

BPI Systems
BPI Personal Accounting $139

Comprehensive Software
PC Tutor ..... $ 55
PC Pal ..... $ 27

Computer Software Technology
Word/PC ..... $ 49

Continental Software
The Home Accounting Plus ..... $ 95
1st Class Mail ..... $ 79
Property Management $309

Davidson & Associates
Speed Reader ..... $ 49

Datamost
Real Estate Investment Program ..... $ 79
Write-On ..... $ 85

Denver Software
Executive Accounting System (128K) $469

Digital Research
Concurrent CP/M 86 ..... $209
C Basic 86 ..... $125
Pascal/MT + 86 ..... $239
Speed Programming Pkg. 86 ..... $125
CIS Cobol 86 ..... $489
CP/M 86 ..... $ 39

Eagle Software
Money Decisions (Vol. I) $129
Money Decisions (Vol. II) $149
Money Pac (Vol. I & II) $249

Fox & Geller
Quick Code (CP/M 86) $199
Quick Code (MS DOS) $199

Hayden Software
Pie Writer $129

Hayes Microcomputer Products
Smartcom ..... $ 72
Hayes Terminal Program ..... $ 65

Howard Software
Real Estate Analyzer II $159
Creative Financing $169

Individual Software
The Instructor ..... $ 29

Innovative Software
T.I.M. III $299
Fast Graphs $189

IUS
Easy Filer $239
Easy Writer $209
Easy Planner $159
Accounts Receivable $369
Accounts Payable $369
General Ledger $369
Financial Management Series $899

Link Systems
Datafax $199

Microcom
Microterminal ..... $ 62

Micro Lab
The Tax Manager $159

Micro Pro
3 Pak Word/Mail/Spell $519
2 Pak Word/Mail $415
2 Pak Word/Spell $429
Wordstar $299
Mailmerge $159
Spellstar $109
Infostar $299
Reportstar $209

Microsoft
Basic Compiler (MS DOS) $249
Business Basic Compiler (MS DOS) $379
MS Pascal Compiler (MS DOS) $329
Microsoft C Compiler $329
MuLisp/MuStar $169
MuMath/MuSimp $189
Multiplan (MS DOS) $179

Microstuf
Crosstalk $129

North American Business Systems
Answer $159

PBL Corporation
Personal Investor ..... $ 89

Perfect Software
Perfect Writer ..... $ 169
Perfect Speller ..... $ 105
Perfect Filer ..... $ 205
Perfect Calc ..... $ 105
Perfect Writer/Speller ..... $ 242
Perfect Filer/Calc ..... $ 279

Peachtree
General Ledger $329
Accounts Receivable $329
Accounts Payable $329
Peach Pak (GL/AR/AP) $329
Peachtext 5000 ..... $229

Peter Norton Computing
Norton Utilities ..... $ 55

Select
Select Word Processing System $299

Software Products International
Logi Calc $129
Pro Calc $229
Logi Quest II $165
Logi Quest III $369

Software Publishing
PFS Report ..... $ 84
PFS File ..... $ 84

Softword Systems
Wordmaker $289

Sorcim/ISA
Supercalc & Supercalc II ..... Ea. $179
Superwriter $239
Spellguard $125

Southeastern
Data Capture ..... $ 75

Synapse
File Manager ..... $ 99

Synergistic Software
Data Reporter $165

T&F Software
P.M.P. 2000 ..... $149

T.M.Q. Software
File Fax $119

Visicorp
Visicalc (256K) $165
Desktop Plan 1 ..... $199
Visitrend/Plot $199
Visifile $199
Visidex $165
Visischedule $199
Business Forecasting Model ..... $ 69
Visiword $249
Visispell $149

COMPUTER OUTLET

Call Toll Free

1-800-634-6766

Order Line Only

Entertainment & New Products

Acorn Software Products
Everest Explorer ..... $ 15
Lost Colony ..... $ 20

Armonk
Executive Suite ..... $ 27

Avalon Hill Game Co.
B-1 Nuclear Bomber ..... $ 15
Midway Campaign ..... $ 15
Computer Stocks & Bonds ..... $ 17
Andromeda Conquest ..... $ 16
Galaxy ..... $ 17
Dnieper River Line ..... $ 23
Voyager ..... $ 17
Draw Poker ..... $ 15
Computer Football ..... $ 15
Computer Facts and Five ..... $ 17

Avant-Garde Creations
Lazer Maze ..... $ 20
Federation ..... $ 20
Air Traffic Controller ..... $ 20

Blue Chip Software
Millionaire ..... $ 65

Broderbund Software
Apple Panic ..... $ 20
Serpentine ..... $ 23

Datamost
Pig Pen ..... $ 20
Space Strike ..... $ 20
Aztec ..... $ 27
Tubeway ..... $ 23

Digital Marketing
Astro Dodge .....

Epyx/Automated Simulations
Temple of Apshai ..... $ 27
Upper Reaches of Apshai ..... $ 15
Curse of Ra ..... $ 15
Crush, Crumble & Chomp ..... $ 20

Infocom
Zork I, II, III ..... Ea. $ 27
Starcross ..... $ 27
Witness ..... $ 34

Information Solutions
The 25th Hour - 25:01 ..... $ 65

Innovative Design Software
Pool 1.5 ..... $ 23

Intelligent Statements
Ken Uston's Professional Blackjack ..... $ 45
Asylum ..... $ 27

Micro Productions
Galactic Encounters ..... $ 23

Microsoft
Flight Simulator ..... $ 34
Microsoft Is A Registered Trademark

Omric Corporation
Space Guardian ..... $ 20
Bling Splatz ..... $ 23
Screen Machine ..... $ 34

Sierra On-Line Systems
Ulysses & The Golden Fleece ..... $ 23
Crossfire ..... $ 20
Mouseattack ..... $ 23
Frogger ..... $ 23

Sentinent
Cyborg ..... $ 23

Sirius Software
Call to Arms ..... $ 20
Space Eggs ..... $ 23
Fowl Play ..... $ 27

Sir Tech
Wizardry ..... $ 39

Strategic Simulations
Galactic Gladiator ..... $ 27
The Warp Factor ..... $ 27
Tigers in the Snow ..... $ 27
Epidemic ..... $ 23

Sublogic Communication
"Night Mission" Pinball ..... $ 27

Education

Computer Software Technology
Word/PC ..... $ 49

Davidson & Associates
Speed Reader .....
Word Attack ..... $ 34
Mathblaster ..... $ 34

Epyx/Automated Simulations
Jabbertalky ..... $ 20

Harcourt Brace
S.A.T. ..... $ 89

Insoft
Wordtrix ..... $ 23
Quotrix ..... $ 23

International Software Marketing (ISM)
MatheMagic ..... $ 65
Graphmagic ..... $ 65
Prism ..... $ 17
Math/Graphmagic Combo $105

Lightning Software
Mastertype ..... $ 34

Sirius Software
Type Attack ..... $ 27

Spinnaker Software
Snooper Troops #1 ..... $ 30
Snooper Troops #2 ..... $ 30
Story Machine ..... $ 23
Face Maker ..... $ 23
Rhymes & Riddles ..... $ 20
Kindercomp ..... $ 20
Hey Diddle Diddle ..... $ 20
In Search of The Most Amazing Things ..... $ 27

WHY DEC AND INTEL CHOSE THE MARK WILLIAMS C-COMPILER.

DEC and INTEL wanted the best C technology available, with excellent code density, supporting the full C language and their specific operating environments—all at a competitive price.

They found it all at Mark Williams.

WHY YOU SHOULD CHOOSE THE MARK WILLIAMS C-COMPILER.

Our C-compiler supports the dominant 16-bit microcomputers—68000, PDP-11,* Z8000, 8086—with a proven reliable, high-technology product. We are shipping versions of C for a large number of environments including CP/M* and PC DOS.* Both cross and native compilers are available.

Call us for the distributor nearest you. OEM's should contact us directly about their specific requirements.

Mark Williams Company
1430 West Wrightwood, Chicago, Illinois 60614,
312/472-6659

Mark
Williams
Company

*PDP-11 is a trademark of Digital Equipment Corporation.
*CP/M is a trademark of Digital Research Corporation.
*PC-DOS is a trademark of IBM.

Reader Service #231

The Help Screen

PC World offers answers and advice on every level.

Karl Koessel

In this month's column we discuss GRAPHICS.COM, the DOS 2.00 external command that gives <Shift>-<PrtSc> (Print Screen) the ability to print graphics display screens on a compatible dot matrix printer, and how to call *WordStar* so it will automatically open a file for editing. We also have a reader who is looking for a PC-compatible keyboard that has separate cursor control and number pad keys, and another reader who requests the Escape sequences that control his printer's functions to be translated into character strings.

GRAPHICS.COM

Q. Could you explain how the DOS 2.00 GRAPHICS command works? The manual says that it can be used to print text mode screens, but I get the same output when I use the <Shift>-<PrtSc> (Print Screen) keys without the GRAPHICS command. Also, I don't get a good copy of the screen. For example, I made a double-line box (using ASCII characters 200, 201, etc.), but when I printed it, I got a single-line box. Is the IBM printer not really compatible with the screen?

One last question. If I use a BASIC program to create a screen, how am I supposed to return to DOS to issue a GRAPHICS command without muddling the screen with a lot of typing?

Michael Trombetta
Manhasset, New York

A. When given the command [*d:path*]GRAPHICS, DOS searches the (specified) directory for the file GRAPHICS.COM. When found, this file adds instructions to DOS, increasing the resident (in memory) size of DOS by 688 bytes. These added instructions remain in memory and enable a PC equipped with a color graphics board to print the contents of a graphics mode screen on a compatible dot matrix printer.

In the medium-resolution (320 by 200) color graphics mode, the contents of the screen are printed using different shades of gray to represent the four possible screen colors. In the high-resolution black and white graphics mode, the contents of the screen are printed sideways with the upper-right corner of the screen printed on the upper-left corner of the paper. These graphics mode screen dumps may take as long as 3 minutes.

The DOS 2.00 manual does not say that the GRAPHICS command can be used to print text mode screens. The manual says, "If the screen is in text mode, the text is printed in under 30 seconds." What the manual means is that the graphics mode screen printing instructions are not used for, nor do they interfere with, the operation of <Shift>-<PrtSc> for text mode screens.

In text mode <Shift>-<PrtSc> has the PC send the printer the ASCII codes for the characters on the screen. But the characters that the PC displays on the screen for codes below 32 or above 126 differ from the printer's.

Also, <Shift>-<PrtSc> does not have the PC send the codes that determine the characters' screen attributes (intensify, blink, underline, and invert character for text mode on the monochrome display, and character color and cell color for text mode on the color display). Therefore, it is true that the IBM printer (or any other printer) cannot reproduce all of what the PC's text mode screen is capable of displaying.

If you are going to do graphics screen dumps from BASIC, you should issue the GRAPHICS command to DOS before you enter BASIC.

Skipping WordStar's Opening Menu

Q. I use an AUTOEXEC.BAT file to set the date and time, create an emulated disk, and call WordStar. *Is there a way I can use AUTOEXEC.BAT to run through to the point of opening a document file for editing (the D command of* WordStar*'s Opening Menu) or even to the point of opening a specific file for editing? I tried adding the file name of the file to be edited to the end of the batch file, but this did not work.*

Percy W. Brower, Jr.
Birmingham, Alabama

A. *WordStar* will open a specific file for editing when the DOS command WS is followed by the name of the file you wish to edit. For example,

A>WS *yourfile* <ENTER>

will call *WordStar*, skip *WordStar*'s Opening Menu, and open *yourfile* for editing. If you replace the WS command of your AUTOEXEC.BAT file with the command WS *yourfile* (as just one line of your batch file), your batch file will always open *yourfile* for editing. However, I wouldn't recommend this; using the same file name for all your word processing will inevitably lead to problems.

I suggest that you use a batch file parameter instead of a specific file name. Because an AUTOEXEC.BAT file will automatically execute when the PC is turned on, you will not be

Effortless Communication



"Modem and software $389, cane and bowler hat not included."

PC Modem Plus & IBM Personal Computer

Effortless The PC Modem Plus™ system contains everything you need to communicate with the IBM Personal Computer—modem, communications software, telephone cable and complete instructions.

Modem The modem card fits inside the PC, connects directly to the phone line and includes an additional IBM-compatible asynchronous port. The full duplex, auto-answer/auto-dial, 300 baud modem can tone or pulse dial and is compatible with most other communications software packages. Full duplex 1200 baud (212) operation is available with the addition of Ven-Tel's PC Modem Plus Speed Adapter.™

Software The full featured communications software has auto-logon and data capturing ability. You can store information from Dow Jones News/Retrieval™ or other sources on disk, exchange information with mainframes, minis or personal computers and transfer files to other Crosstalk™-compatible systems.

From Ven-Tel Inc.
Modems That Mean Business
2342 Walsh Avenue, Santa Clara, CA 95051 • (800) 538-5121 • (408)727-5721

PC Modem Plus and PC Modem Speed Adapter are trademarks of Ven-Tel Inc. The PC Modem Speed Adapter will be available second quarter 1983.
IBM is a registered trademark of International Business Machines Corporation. Dow Jones News/Retrieval is a registered trademark of Dow Jones & Co. Crosstalk is a trademark of Microstuf, Inc.

able to supply the batch file with a value (in this case the name of the file you wish to edit) to be used in place of the parameter. Therefore, you need to rename the AUTOEXEC.BAT file. Let's name it PWS.BAT for Percy's *WordStar* batch file. Now replace the batch command `WS` with `WS %1` (`%1` is the parameter).

PWS.BAT is now ready. Simply answer the DOS prompt with `PWS` *filename* where *filename* is the name of the file you wish to edit. When the batch file executes the `WS %1` command, it will replace `%1` with *filename*, display `A>WS` *filename* on the screen, call *WordStar*, and open *filename* for editing.

You can learn more about the power of using parameters in batch file commands from the section called Batch Processing (now called Batch Commands for DOS 2.00) in the chapter on DOS commands in the DOS manual.

Number Pad vs. Cursor Keys

Q. As a happy PC owner, I have only one major complaint and it has to do with the keyboard; more specifically, the combined number pad and cursor control keys. It turns out that most number entries also involve a lot of cursor movement. I finally gave up and use the numbers in the top row of the keyboard. This was perhaps acceptable in competition with the old Apples and TRS-80s, but it isn't now. It is particularly galling if you are used to the convenience of using the number pad by touch. Do you know of anyone who makes a keyboard that is compatible with the IBM PC and separates these two functions?

John Black
Camarillo, California

A. The <NumLock> toggle key has caused a lot of grief, and even the third-party keyboards that have little red indicator lights on the toggle keys are not much help for those who use the number pad by touch. Several software companies are preparing to release programs that use a mouse to control cursor movement (see "To Build a Better Mouse," Lisa B. Stahr, *PCW*, Vol. 1, No. 2). The mouse may be just the answer to your problem. As for an IBM PC-compatible keyboard that separates the cursor keys and the number pad, no, I don't know of any. If any readers are aware of such, please drop a line to *The Help Screen*. One possible solution I can suggest, however, is to use a keyboard redefinition program such as *ProKey* or *Keynote* to redefine four of the function keys as cursor controls. You'd probably have to find some keys to hold those function keys' previous meanings, but you would free up the numeric keypad for data entry.

Meanwhile, I am told that many people don't realize that they don't have to use the <NumLock> key to access the number pad. Simply hold down the <Shift> key with your left hand while you use the 11 white keys on the right end of the keyboard. They will behave as a number pad. Let the <Shift> key up, and the keys perform their cursor control functions.

Escape Codes Demystified

Q. A year ago I purchased my IBM PC from a ComputerLand in Phoenix. I also purchased a C. Itoh letter quality printer, model FP 1500-45. The book that came with the printer spoke of Escape codes, but because I am not a programmer, these codes might as well be in Greek. I went back to ComputerLand for assistance in learning how to control the printer (i.e., bidirectional printing, underlining, boldface, etc.). I assumed that they could provide me with LPRINT CHR$ commands that would allow me access to the functions. The salesman stated that he had no other books or knowledge regarding the C. Itoh printer and thus could not help me. I then contacted the distributor, Leading Edge, in Massachusetts and explained my dilemma. They too were sorry and did not know what LPRINT CHR$ codes would operate the printer; they only knew ESC codes and could not tell me the exact method to use to activate the functions.

I am totally frustrated. When I use WordStar, *all the above modes are functional, yet in trying to do programming and wanting some control over the printer, I am at a total loss.*

Eddie L. Redman
Phoenix, Arizona

A. When trying to do programming, one must do as the Romans do—speak Greek. All kidding aside, it's not that difficult. But, if you want to have some control over the printer, you need to read the book that comes with the printer.

Before we get into CHR$ and Escape codes, let's reflect upon the positions of the parties you've mentioned. Salespeople are generally very helpful before you give them your money. But only you know whether you have learned what you wanted to know about the operation of the equipment you intend to purchase.

Share and share alike.



With SCS PCnet™, a true, low-cost network for IBM Personal Computers.

Share and grow with PCnet from Santa Clara Systems . . . the true local area network for the IBM Personal Computer (PC) and its MS-DOS operating System. PCnet allows the sharing of hard disks, floppy disks, letter-quality printers, modems, and internal memory by all networked PCs. So you can add new dimensions of capability to your system while reducing your per station costs!

True network news

With its proprietary, on-board intelligence, PCnet permits direct communication between all PCs in your network. If one goes down, the others don't. Unlike other network products, a dedicated disk server is not necessary, saving you money. In fact, no extra hardware is required to add more stations; just one PCnet board for each and you're set. Plus, PCnet is transparent to all IBM and compatible software.



Service for thousands

You have plenty of room to grow. And, as you add more users, your peripheral resource power and memory capacity increase linearly. For all that it offers, PCnet is surprisingly easy to install. Just plug a PCnet board into an I/O slot of each IBM PC you want to include in your network. Then tap into the standard coaxial cable—offered in lengths of more than one mile with PCnet!

The extras you'll like

You'll appreciate the specialized network utilities available with PCnet. Like print spooling, multi-tasking, and file-locking. Plus the ability to communicate with IBM PC look-alikes. In addition, the Pascal Bubble™ is supported under MS DOS.

Full customer support

Only Santa Clara Systems offers you worldwide support with PCnet. A full 90-day warranty. *And a complete line of hard-disk storage products tailor made for use with the PCnet,* featuring up to a ½ gigabyte of storage per PC and removable Winchester cartridges for backup.

See the difference sharing can make in your business. Our starter kit has everything you need to network two PCs right away—two PCnet boards, cable, and documentation. For more information, call or write us today!

Santa Clara Systems, Inc.

1860 Hartog Dr., San Jose, CA 95131
(408) 287-4640/Telex: 176309 SCS SNJ

PCnet is a registered trademark of Orchid Technology
Pascal Bubble is a registered trademark of DATALEX

Reader Service #164

You can't really blame the distributor for being ignorant of the syntax of your particular computer, which is probably one of hundreds that can use the printer.

Now get your printer's manual. The printer's functions are controlled by sending the printer a sequence of characters. The C. Itoh manual divides these functions into two categories: function codes and Escape sequences.

The function codes are simple. For example, to make the printer backspace, you use a function code of 8 such as `LPRINT CHR$(8)` . You should have no problem learning your printer's function codes as long as you don't confuse decimal and hexadecimal values.

The Escape sequences are just as easy. They are called Escape sequences because they are strings (sequences of ASCII character codes) that begin with CHR$(27), the ASCII value for the control character ESC (see Appendix G, pages G-1 and G-2 of the BASIC manual). For example, to do a half-line feed down, you use an Escape sequence of ESC D.

```
LPRINT CHR$(27) "D"
```

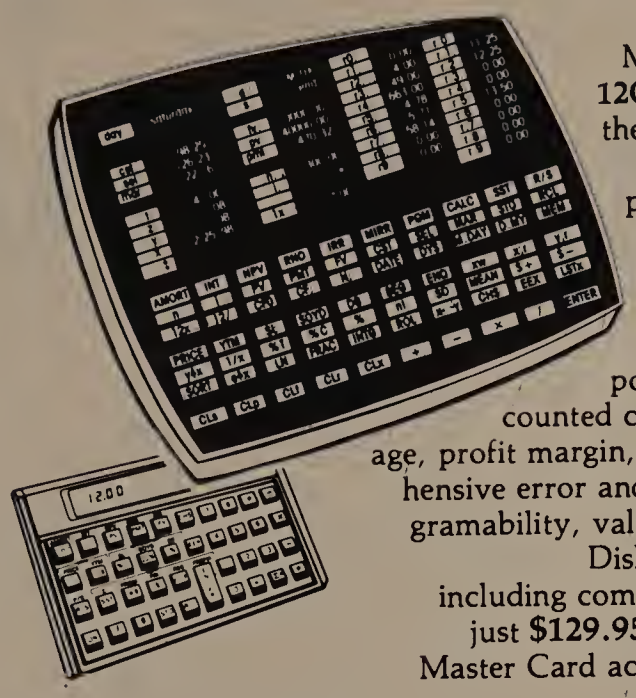
will do half a line feed. You will also get the same results from

```
LPRINT CHR$(27) CHR$(68)
```

One last point. The C. Itoh printer you have does not directly support boldface printing. To accomplish this you will have to backspace and reprint.

Do you have questions concerning the IBM PC or the new compatibles? Send them to The Help Screen, PC World, *555 De Haro St., San Francisco, CA 94107.*

Finance 12Q™ calculations: What you get is what you see.



MicroQ's breakthrough, **Finance 12Q**, performs all the functions of the most popular executive/financial calculators with computer power, calculator simplicity and one important difference: a screen display of *all* values at-a-glance.

Finance 12Q provides compound interest, amortization, discounted cash flow, depreciation, percentage, profit margin, on-line help screen for comprehensive error and command reporting, user programability, value annotations and much more.

Diskette programs for the IBM PC, including comprehensive, easy-to-use manual, just **$129.95**. Call (703) 385-6450. Visa and Master Card accepted. Dealer inquiries invited.

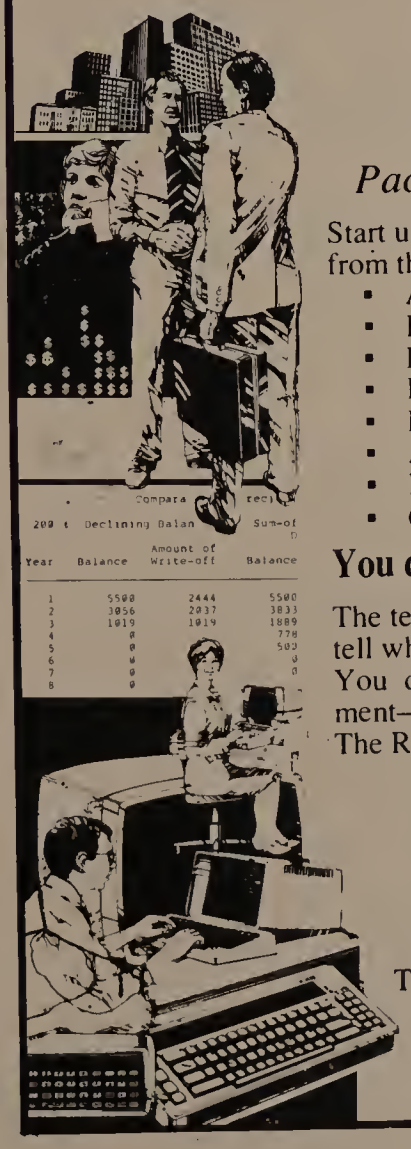
Specific calculation capabilities include:
Net Present Value (NPV) / Modified Internal Rate of Return (MIRR) / Present Value / Future Value / Payment Amount / Number of Payments / Interest Rate / Odd-Period / Gross Profit Margin (GPM) / Selling Price / Cost / Amortization / Depreciation / Straight-Line / Sum-of-the-Year-Digits / Declining-Balance / Bond Price / Bond Yield / Mean / Standard Deviation / Weighted Mean / Linear Estimation / and more...

MicroQ Incorporated
3843 Plaza Drive / Fairfax, Virginia 22030
Reader Service #114

NEW!

For the IBM Personal Computer®

The most complete Real Estate Analysis Package available for use with Lotus 1-2-3 ™.



Start using the most powerful programming features of 1-2-3 from the minute you open the package to do

- Amortization Schedules
- Depreciation Schedules
- Prospective Property Owner Income Forecast
- Personal Financial Statement
- Internal Rate of Return
- ACRS Tax Calculations and Analysis
- Raw Land Syndication
- Graphs included in many analyses

You don't need an MBA to use the Real Estate Guide

The templates are fully integrated into 1-2-3; many users can't tell where 1-2-3 stops and our templates begin!
You don't have to spend hours analyzing a potential investment— do it in minutes with the Real Estate Guide!
The Real Estate Guide runs on any computer that supports 1-2-3.

Available for only $159.95.
Manual only $29.95.
Subsequent price applies to purchase of templates.

Check, VISA or Mastercard.

Guidance Software / Division of Intran, Inc.
Two Kingwood Place, Suite 163 • Kingwood, TX 77339
(713) 358-7191 • Telex 775-705

Dealer Inquiries Invited
1-2-3 is a registered trade mark of Lotus Development, Inc.

PC pande
Call us for

SOFTWARE

ApTec *(for color Prism Printers)*
Rainbow Writer Color Text Formatter . . . $119.
Rainbow Writer Screen Grabber . . . . . 69.
Ashton Tate
dBase II (DOS or CP/M-86) . . . . . 397.
Best Programs
PC/Personal Finance Program . . . . . 65.
PC/Fixed Asset System . . . . . 239.
Bible Research
THE WORD *(KJV Bible — 7 disks)* . . . . . 149.
Continental
Home Accountant Plus . . . . . 95.
FCM *(was First Class Mail)* . . . . . 79.
Conceptual Instruments
The Desk Organizer *(30 day return guarantee if not satisfied)* . . . . . 250.
Digital Research
CP/M-86 . . . . . 39.
DR LOGO . . . . . 109.
Financier
Financier Personal Series . . . . . 119.
Financier Tax Series. . . . . 119.
Hayden
PIE:Writer . . . . . 149.
Hayes
Smartcom II . . . . . 79.
IUS *(now XT and DOS 2.0 compatible)*
EasyWriter II . . . . . 199.
EasySpeller II *for EasyWriter II* . . . . . 129.
EasySpeller 1.1 *for EasyWriter 1.1* . . . . . 83.
Accounts Receivable . . . . . 339.
Accounts Payable . . . . . 339.
General Ledger . . . . . 339.
Package Price for above three . . . . . 879.
Inventory . . . . . 339.
Order Entry . . . . . 339.
Lifetree
Volkswriter . . . . . 119.
Volkswriter International *(fully supports 5 languages)* . . . . . 149.
Link Systems
Datafax . . . . . 189.
Lotus Development
1-2-3 *(version 1A — the newest!)* . . . . . call
Micropro
WordStar 3.3 . . . . . 269.
ProPak *(WordStar/MailMerge/SpellStar/StarIndex)* . . . . . 397.
Microsoft
Multiplan . . . . . 169.
Multi-Tool Word *(with mouse)* . . . . . call
PCsoftware
PCrayon *(create in full color with easy to use graphics tool)* . . . . . 39.
CREATABASE . . . . . 59.
Peachtree
PeachPak (G/L, A/R, A/P) *see above special*
PeachText 5000 . . . . . 237.
Pearlsoft
Personal Pearl . . . . . 189.

PC Connection Software Special
through September 30, 1983

PEACHTREE
PEACHPAK (Series 4)
The most professional accounting system available for under $300
- Includes A/R, A/P, and G/L
- A/R and A/P will stand alone or update G/L
- Runs under DOS 1.1
- Includes samples and demo data disks
- Detailed manuals make it easy to use

Complete PeachPak System . . . . . **$ 237.**

Peter Norton
Norton Utilities . . . . . $55.
Rosesoft
ProKey *(customize your keyboard)* . . . . . 59.
Software Arts
TK!Solver . . . . . 219.
Financial Management Pack . . . . . 87.
Mechanical Engineering Pack . . . . . 87.
Software Publishing
PFS/File . . . . . 97.
PFS/Graph . . . . . 97.
PFS/Write . . . . . 97.
PFS/Report . . . . . 87.
Softword Systems
Multimate (was Wordmate) . . . . . 329.
Sorcim
Supercalc II . . . . . 159.
System Software Services
PCModem 1.3 *(for Smartmodem 300)* . . . . 39.
PCModem 1.4C *(for Smartmodem 1200)* 69.
VisiCorp
VisiCalc 256k (w/free CDEX training program — *limited time*) . . . . . 165.
VisiFile . . . . . 199.
VisiSchedule . . . . . 199.
VisiTrend/Plot . . . . . 199.
VisiWord (w/free VisiSpell mail in — *limited time*) . . . . . 269.

EDUCATIONAL

Comprehensive
PC Pal *(for first time users)* . . . . . 27.
PC Tutor *(more in depth instruction)* . . . . . 55.
FriendlySoft
FriendlyWare/PC Introductory Set . . . . . 39.
Individual Software
The INSTRUCTOR . . . . . 35.
Spinnaker
Educational Games for Young Computer Users (require graphics board)
Snooper Troops I *(ages 10 to adult)* . . . . . 30.
Snooper Troops II *(ages 10 to adult)* . . . . . 30.
Most Amazing Thing *(ages 10 to adult)* . . . 27.
Face Maker *(ages 4 to 12)* . . . . . 23.
Story Machine *(ages 5 to 9)* . . . . . 23.
Kinder Comp *(ages 3 to 8)* . . . . . $23.
Rhymes and Riddles *(ages 5 to 9)* . . . . . 20.
Hey Diddle Diddle *(ages 3 to 10)* . . . . . 20.
Stone *(requires graphics board)*
My Letters, Numbers, and Words *(great graphics and sound — ages I to 5)* . . . . . 29.

GAMES

Broderbund
Apple Panic . . . . . 23.
EPYX/Automated Simulations
Temple of Apshai . . . . . 27.
Upper Reaches of Apshai . . . . . 15.
Curse of Ra . . . . . 15.
Star Warrior . . . . . 27.
Rescue at Rigel . . . . . 23.
Crush, Crumble, and Chomp . . . . . 23.
FriendlySoft
FriendlyWare/PC Arcade . . . . . 39.
Funtastic/
Snack Attack II *(a favorite)* . . . . . 27.
Cosmic Crusader *(as good as above)* . . . . 27.
Big Top *(hours of fun!)* . . . . . 29.
Master Miner *(1 or 2 players)* . . . . . 29.
Infocom
High quality text games
Zork I . . . . . 27.
Zork II . . . . . 27.
Zork III . . . . . 27.
Starcross . . . . . 27.
Deadline . . . . . 35.
Suspended . . . . . 35.
Witness *(NEW)* . . . . . 35.
Microsoft
Flight Simulator *(with 93 page manual)* . . . 35.
ScreenPlay *(mono or graphics board)*
Asylum . . . . . 29.
Dunzhin *(with voice)* . . . . . 29.
Sierra/On-Line
Frogger . . . . . 27.
Crossfire *(keyboard or joystick)* . . . . . 23.
Ulysses and the Golden Fleece . . . . . 27.
Strategic Simulations
The Warp Factor . . . . . 27.
Tigers in the Snow . . . . . 27.
Epidemic . . . . . 25.
Sublogic
Night Mission Pinball . . . . . 29.
Zee Programming
Zuran Defender *(highly addictive)* . . . . . 25.

HARDWARE

AST Research
(For IBM-PC or XT)
We are a full line AST Research Dealer
All AST Boards come with SuperDrive, SuperSpool, and one year warranty.
SixPakPlus 64k *upgradable to 384k, with clock calendar, serial and parallel ports (game port optional)* . . . . . *see above special*

© COPYRIGHT PC CONNECTION 1983. ALL ITEMS SUBJECT TO AVAILABILITY PRICES SUBJECT TO CHANGE WITHOUT NOTICE. IBM IS A REGISTERED TRADEMARK OF IBM CORP

monium?
free advice.

MegaPlus II 64k *upgradable to 256k (or more with MegaPak) with clock calendar and serial port (game port optional)* . . . . $269.
MegaPak 128k (not upgradable) . . . . . 187.
MegaPak 256k . . . . . 279.
I/O Plus II *(clock calendar and serial port)* 115.
Parallel Port or second Serial Port or Game Adapter for MegaPlus II, I/O Plus II, or SixPakPlus . . . . . 35.
PCnet . . . . . call
Connectall *Bracket for Extra Cables* . . . . . 15.

Amdek
MAI Board *(color & monochrome)* . . . . . 469.

CompuCable
Plastic Keyboard & Drive Covers (set) . . . . 19.

Curtis
PC Pedestal *(for IBM Mono or Color)* . . . . . 65.
PGS or Quadchrome display adapter . . . . . 9.
System Stand *(holds PC vertically)* . . . . . 21.
Extension Cable for IBM Mono Display . . . 44.
Keyboard Extension Cable *(3 to 9 feet)* . . . 36.

Electronic Protection Devices
with Lloyd's Insurance Protection
The Lemon *(surge protector)* . . . . . 44.
The Peach *(surge protector)* . . . . . 69.

Epson
FX-80 with GRAFTRAX-Plus . . . . . call
FX-100 with GRAFTRAX-Plus *(it's out!)* . . . call
Epson to IBM Parallel Cable . . . . . 32.

FTG Data
Light Pen (Push Tip) . . . . . 159.
Demo Disk Set for Light Pen . . . . . 39.

Hayes
Smartmodem 300 . . . . . 209.
PCModem Software 1.3 (for above) . . . . . 39.
Smartmodem 1200 . . . . . 499.
PCModem Software 1.4C (for above) . . . . 69.
Smartmodem 1200B *(w/Smartcom II)* . . . 439.
Smartcom II . . . . . 79.
Smartmodem-to-IBM Cable . . . . . 25.

Hercules Computer
Hercules Graphics Card *(parallel port)* . . . 359.

IDS
Prism 80 Printer *(with all four options)* . . . 1397.
Prism 132 Printer *(with all four options)* 1597.
Prism to IBM Parallel Cable . . . . . 32.

key tronic
Typewriter style keyboard . . . . . call

Kraft
Joystick . . . . . 45.

Maynard Electronics
Floppy Drive Controller . . . . . 159.

Microsoft
System Card 64k *(upgradable to 256k) with clock calendar, serial port, parallel port* . . . call

Mouse Systems
PC Mouse *(3 button optical mouse comes with power supply, desk pad, and software connects to serial port)* . . . . . $239.

NEC
Spinwriter 3550 *(IBM-PC compatible)* . . . 1878.

Plantronics/Frederick
COLORPLUS . . . . . 379.

Princeton Graphics
PGS *(RGB Monitor now displays brown)* . . call

Quadram
We are a full line Quadram Dealer
Quadboard 64k *(upgradable to 256k, with Quadmaster Software, clock calendar, serial and parallel ports)* . . . . . 269.
Microfazer Printer Buffer *(parallel) w/copy MP 64 (64k) upgradable to 512k* . . . . . 188.
Quadchrome *(Hi Res RGB Monitor)* . . . . . 489.
Quadlink *(allows you to run most Apple II programs directly on your IBM-PC or XT)* call

Silver Reed *(letter quality)* Silver Reed EXP 500 Printer *Par/Ser, 132 column, quiet, smooth, and solid* . . . . . 649.

Star Micronics
Gemini 10X (totally Epson compatible) . . . 329.

TG
Joystick . . . . . 45.

Tandon
TM 100-2 (5 1/4") Drive (DS,DD) *configured as Drive A or Drive B for your PC. Comes with complete step by step installation instructions and Tandon manual* . . . . . 259.

USI *(monitors for graphics board)*
Pi-2 Monitor (12" green, with cable) . . . . . 149.
Pi-3 Monitor (12" amber, with cable) . . . . 164.

PC Connection Hardware Special
through September 30, 1983

AST RESEARCH
SixPakPlus
AST's newest multifunction memory board features:
- 64k upgradable to 384k using standard chips *(on 1 board)*
- Clock Calendar, Serial Port, Parallel Port
- SuperPak disk with SuperDrive and SuperSpool
- Optional Game/Joystick Adapter ($35)
- One year warranty on parts and labor
- Detailed User's Manual included
- 100% compatibility with the PC & XT and DOS 1.1 & 2.0 . . . . . **$ 269.**

CONNECT WITH US
Need more information on our products? Buying your first PC or XT and want advice on hardware compatability and software performance? Call us. We have the IBM-PC experience. Monday through Friday 9:00 to 5:30 at 603/446-3383.

OUR POLICY
- We do not charge your card until we ship.
- No surcharge added on VISA and Mastercard.
- No sales tax.
- We fully insure all shipments at no additional charge.
- Allow one week for personal and company checks to clear.
- COD maximum $500. Cash or certified check.
- 120 day guarantee*

SHIPPING
United States: For monitors, printers, drives, and furniture, add 2% to all orders. For all other items, add $2 per order for UPS surface, $3 per order for UPS 2nd Day Air.

Canada and Mexico: We add freight charges to credit card purchases. For prepayment, include 3% for monitors, printers, drives, and furniture. For all other items, add $4 per order for shipping charges.

MEMORY
64k Memory Upgrade Set for IBM-PC or XT system board . . . . . 59.
64k Memory Upgrade Set for any memory board *specify make of board* . . . . . 59.
Install memory upgrades and run diagnostics *at time of board purchase only* . . . . . 10.

DISKS
Verbatim *(with 5 year guarantee)*
Datalife Disks SS/DD *plastic box of 10* . . . . 29.
Datalife Disks DS/DD *plastic box of 10* . . . 39.
Flip Sort *(holds 75 disks)* . . . . . 19.

INFORMATION SERVICES
Compuserve
Compuserve *(includes subscription, manual, 5 hours of connect time, and monthly publications)* . . . . . 39.

Source Telecomputing
The Source *(subscription & manual)* . . . . . 69.

800/243-8088
PC Connection 6 Mill St., Marlow, NH 03456
603/446-3383

For the IBM-PC *Exclusively.*

PC CONNECTION™

ACCOUNTING SOFTWARE

for Portable, Personal and Desktop Computers

Available for these popular 8-bit and 16-bit microcomputer formats:

All CP/M® 8" Computers (SD)
All IBM PC Compatibles
TRS-80 Model 2 (with CP/M)
TRS-80 Model 4 (with CP/M)
Apple II (with CP/M)
Apple IIe (with CP/M)
Franklin ACE (with CP/M)
Morrow Micro Decision
Northstar Advantage
Corona PC & Portable
Corona Portable
COMPAQ Portable
Hyperion Portable
Seequa Chameleon
TI Professional
Columbia MPC
Osborne Executive
Osborne I (SD)
Osborne I (DD)
DEC VT-180
CompuPro
Xerox 820
IBM PC
IBM XT
KayPro II
KayPro 10

Call about other formats



"...for several years the defacto standard for microcomputer software, and still a good example of some of the better thought-out software on the market." —Interface Age

SATISFACTION GUARANTEED or Your Money Back

Complete Package of Software, Training Aids, Manuals, and Users' Newsletter

ONLY
$395 CP/M format
$495 IBM format

Desktop Accountant™

FULL-FEATURE, FULLY-INTEGRATED ACCOUNTING SYSTEM

Everything you need to keep the books...at a price you can afford!

Your Bookkeeper, Accountant, and Banker will love you for installing this fine system!

Check these features:

This remarkably-valued Accounting System will manage your company's business records and **automate your entire bookkeeping process**—from the posting of individual transactions to producing up-to-the-minute Income Statements, Balance Sheets, and other important management reports. Desktop Accountant™ gives you a "Big Company," professional image with **printed** invoices, statements, and checks. It is **user-friendly, completely menu-driven,** offers **system-prompted data entry,** and is compatible with both floppy and hard disks. Feature-for-feature, and dollar-for-dollar it is **the best software value on the market!** But don't let the **low price** fool you. Desktop Accountant™ is **not** a **"cheap" accounting system, only inexpensive.** That's because original development costs were recovered years ago allowing us to sell **an excellent product** in high volume at low prices and still earn a fair profit. This **high-quality, reliable software** was designed and written in 1975 for small-to-medium sized businesses. Since then, **it has successfully proven itself in well over 10,000 companies** in all 50 states and in 13 foreign countries. It is also used and recommended by **hundreds** of bookkeepers, accountants and CPA's, including the regional offices of several famous "Big Eight" accounting firms! No other Accounting System offers you so many features, benefits, and valuable extra services. You can pay more but you can't buy more! Desktop Accountant™ is backed by our 30-day, no-risk, **money-back guarantee** of 100% customer satisfaction! Call for **free literature** or order now with complete confidence.

Read What Users Say...

"Two hours after receiving the Desktop Accountant I was up and running live data, and generated an entire month's work and financial statements the following day."
—J.C. Bartels, President
(accounting firm) Gonzales, Texas

"To get anything better we would have had to spend multiple thousands of dollars. I think it's a dynamite package for the money."
—Bob Cox, V.P. General Mgr.
(manufacturing company) San Antonio, Texas
LETTERS ON FILE

Here's what you get:

1. A professional-quality, full-feature, fully-integrated accounting system. **2.** Six-to-fourteen diskettes (depending on your system's disk storage capacity). **3.** Four easy-to-follow, self-teaching User's Manuals (over 540 pages!) that are **highly rated by satisfied users. 4.** An exclusive, new **audio cassette tape** with **step-by-step instructions** for quick installation and start-up. **5.** "Read Me First" a unique 40-page system guide and start-up aid. **6. Complete sample data and sample reports** for practice and training...a big help to new users. **7. FREE 1-year subscription to Users' Newsletter,** "Debits and Credits." It's full of tips, ideas, news, and useful suggestions from us and other users. Recent issues have run over 20 pages long! **8. FREE complete Source Code** in popular MBASIC so you can easily customize *any* program to suit your special needs. **9.** Telephone "Hot Line" service for helpful Installation support, Start-up support, Technical support, and Training support. The quality of our cheerful customer support has been acclaimed **"excellent," "first-rate,"** and **"very courteous and professional"** by our users. **10.** Access to our growing network of **Experienced User Consultants**™ in both the U.S. and Canada. These qualified, knowledgeable businesspeople themselves own this fine software and are available to assist you with almost any aspect of installation, training, operation—or even customization, if desired. You'll receive the latest **Directory** of these helpful Consultants.

Look who's using it:

Here is a sample (taken from our customer files) of the wide variety of businesses successfully using this time-tested, solidly-established, user-proven software:

• Bookeeping services • CPA/Accounting firms • Construction companies • Wholesale Florists • Retail Florists • Printers • Insurance Agencies • Shopping Centers • Mechine Shops • Engineering firms • Softwere Companies • Computer retailers • Publishers • Financiel services companies • Investors • Appliance service firms • Dairies • Boilerworks • University Business School • Catholic Diocese • Beptist Ministeries • Seil Meker • Convelescent Hospital • Car Wesh • Public Library • Cement Plant • Industriel products manufecturing companies • Mortuary • Coel Company • TV/Film producers and distributors • Generel Store (in Aleske!) • Health services orgenization • Government Agencies • Record end Tepe stores • Trade Association • Graphics firms • Office products companies • Reel Estete firms • Oil Products distributor • Instrument Compeny • Hydreulic Products compeny • Outdoor Expeditions compeny • Meny types of schools • Chiropractors • Physiciens • Landscapers • Lew firms • Resteurants • Plumbing Companies • Railroed • Farmers • Banks • Consultants • and meny, meny, more!!

A Complete System!

includes all four standard general accounting programs:

GENERAL LEDGER is completely integrated to automatically post end-of-month transactions from A/R, A/P and Payroll. It **prints 13 detailed reports** for the entire company, and optional **Income Statements for up to 99 departments.** It produces up-to-the-minute **comparative financial statements** with current, year-to-date, budget, and last year (month and YTD), showing **both dollar amounts and percentages,** and presents everything you, your bookkeeper, and your accountant need to know about the company ● G/L **automatically reconciles all accounts,** and maintains extensive, **detailed audit trails** showing the source of each G/L entry for quick, easy, tracing ● Trial Balance includes all transactions ● **Flexible Chart of Accounts** ● True double-entry bookkeeping ● Master File capacity: 400 Accounts ● Monthly Transactions capacity: 1,000 with 200K diskette; 3,500 with 500K diskette; 7,000 per Megabyte with a Hard Disk.

ACCOUNTS RECEIVABLE provides **instant, on-line customer account information (both current and aged),** with complete, timely invoicing, including open-item (or balance forward) and statement capabilities. It makes the entire billing process fast, easy, and efficient. It quickly identifies your overdue accounts, **helps speed collections,** helps control your cash flow, and assists you in making better financial decisions. Both detailed and summary **customer activity and aging reports** are instantly available ● Preprinted forms available for **invoices and statements** ● **Detailed audit trail** ● Maintains comprehensive customer data files ● **Produces 8 reports and documents** ● Includes automatic periodic customer/client billing option which is ideal for service businesses ● **Itemized monthly transactions** ● Master File capacity: 400 Customers ● Monthly Transactions capacity: 800 with 200K diskette; 3,500 with 500K diskette; 7,000 per Megabyte with a Hard Disk.

ACCOUNTS PAYABLE maintains complete vendor/voucher history and includes **check-writing** capabilities. **Current and aged payable reports** are available upon command. It prepares an extremely useful **cash flow/cash requirements report** that greatly improves management control of your most valuable resource—cash! It prints checks (on commercially available forms on which **your company name, address and logo can be imprinted**) with comprehensive check stubs that your vendors will appreciate ● **Produces 11 reports and documents** ● Automatic pay selection program allows payment by due date or by discount date ● **Manual and automatic checkwriting** ● Check register ● **Detailed audit trail** ● Itemized monthly transactions ● Master File capacity: 400 Vendors ● Monthly Transactions capacity: 800 with 200K diskette; 3,500 with 500K diskette; 7,000 per Megabyte with a Hard Disk.

PAYROLL is a complete, **easy-to-use** professional-quality payroll system. Be the office hero each week when the checks come out on time! This program **calculates payroll for every type of employee** (hourly, salaried, and commissioned) and **prints payroll checks** (with popular, comprehensive check stubs) with an absolute **minimum** of input. **Your company name and logo** can appear on these, too. ● Stores and reports comprehensive employee and payroll information. ● Maintains monthly, quarterly, and yearly totals for reporting purposes in **multiple states**(!) ● Offers **user-maintainable Federal, State, and local tax tables**(!). ● W-2 printing ● 941 Reporting ● **Produces 10 reports and documents** ● Master File capacity: 400 employees. An **outstanding** Payroll package!

Produces 42 Reports & Documents:

General Ledger **1.** Chart of Accounts **2.** Chart of Accounts with summary dollar amounts **3.** Chart of Accounts with prior year comparisons **4.** Daily Transactions Report **5.** Itemized Monthly Transactions **6.** Balance Sheet **7.** Balance Sheet with prior year comparison **8.** Income Statement **9.** Income Statement with prior year comparison **10.** Departmental Income Statement(s) **11.** Departmental Income Statement(s) with prior year comparison **12.** Detail report for individual accounts **13.** Trial Balance Statement

Accounts Receivable **1.** Daily Transactions Report **2.** Invoices (with or without preprinted forms) **3.** Statements (with or without pre-printed forms) **4.** Summary Aging Report **5.** Detailed Aging Report **6.** Itemized Monthly Transactions **7.** Detailed Customer Activity Report **8.** Summary Customer Account Report

Accounts Payable **1.** Daily Voucher Report **2.** Daily Credit Report **3.** Checks with Detailed stubs **4.** Check Register **5.** General Ledger Transfer Report **6.** Cash Requirements Report **7.** Transaction Register **8.** Open Voucher Report **9.** Aged Payables Report **10.** Detailed Vendor Activity Report **11.** Summary Vendor Account Report

Payroll **1.** Federal Tax Tables **2.** State Tax Tables **3.** Payroll checks with stubs **4.** Payroll Check Register **5.** Monthly Payroll Summary **6.** Quarterly Payroll Summary **7.** General Ledger Transfer Report **8.** Detailed Employee File Listing **9.** Produces 941 Worksheet **10.** Prints annual W-2 Forms

System Requirements: Either CP/M® or MS-DOS (PC-DOS) ● Microsoft BASIC ● 64K RAM ● Two disk drives or hard disk ● 132 column wide carriage printer, or an 8½"x11" printer with compressed print mode (an Epson MX-80 or similar printer).

100% SATISFACTION GUARANTEE

No-Risk, 30-day Money-Back Guarantee

Order Desktop Accountant and evaluate it yourself for 30 days. Test the performance of each program using our comprehensive *Sample Data Files* to enter and process data, query accounts, print checks and reports, and more. Review the five User's Manuals, hear the Training Tape, read the users' Newsletter, even call our Technical Support Group with your questions. ***You must be completely satisfied*** with Desktop Accountant or you may return it in good condition *with the Sealed Master Disk UNOPENED* (it installs *your* live data) for a prompt, courteous, complete refund!

*Call for **FREE LITERATURE**, including sample reports, comparison chart, user letters, etc.*
Not sold in stores • Order today by Mail or Phone • Phone Orders Filled Promptly

Orders, Questions, and Literature Requests CALL NOW, TOLL-FREE

MasterCard VISA **1-800-832-2244**

Please mention Ad #120-J

In California call 1-800-732-2311

Technical Support Hotline (8 AM to 5 PM, Mon.–Fri.): (415) 680-8378

Send Orders To: 1280-C Newell Avenue, Suite 147-J, Walnut Creek, California 94596

• When ordering please mention or include the Ad number appearing near our telephone number • Orders shipped within 48 hours via UPS • Add $5.00 for faster 2-day Rush Air Service • California residents add 6½% Sales Tax • Payment by VISA/MasterCard/COD/MO/Cashier's Check • All Brand Names are manufacturers' registered Trade Marks • No sales to Dealers • Foreign orders please call or write before ordering • © 1983 Rocky Mountain Software Systems.

ROCKY MOUNTAIN SOFTWARE SYSTEMS
Specialists in Accounting Software

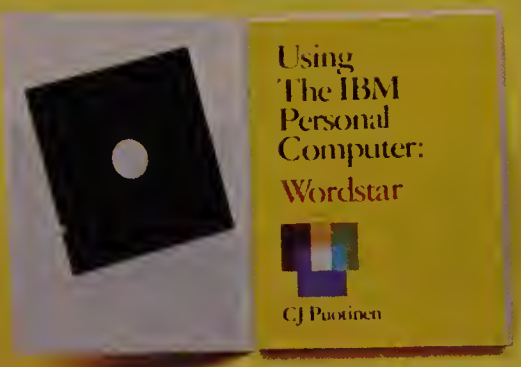
Reader Service #161

Whatever you need to do with your IBM Personal Computer...

Our book/software series can show you how.



Programming the IBM Personal Computer: UCSD Pascal
Seymour V. Pollack
A self-paced introduction to UCSD Pascal (and programming) on the Personal Computer, using the UCSD p-System. Many examples and problems, both serious and whimsical.
Book/Diskette Package:
1983, 323 pages, $34.95
ISBN 0-03-063978-6

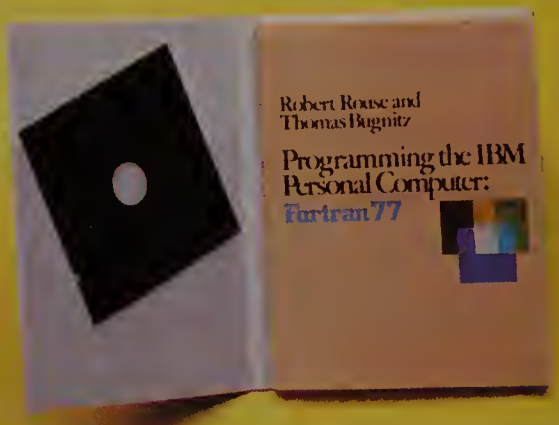


Using the IBM Personal Computer: Wordstar
CJ Puotinen
Even for those unfamiliar with the Personal Computer, this book's many examples and projects will easily lead to mastery of the *Wordstar* word processing system.
Book/Diskette Package:
1983, 272 pages, $34.95
ISBN 0-03-063981-6

Using the IBM Personal Computer: Visi-Calc
Robert Crowley
Learn Visi-Calc step-by-step on your Personal Computer; work on projects—some easy, others not—in a wide range of application areas.
Book/Diskette Package:
1983, 256 pages, $35.95
ISBN 0-03-063982-4

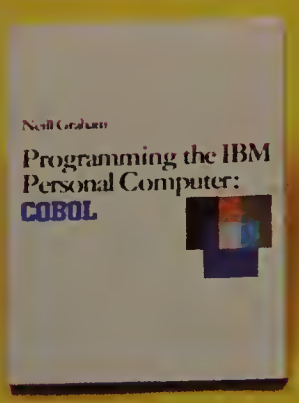


Programming the IBM Personal Computer: Fortran 77
Robert Rouse and Thomas Bugnitz
Examples, problems, and exercises from science and engineering illustrate both introductory and advanced topics, including IBM's Fortran compiler.
Book/Diskette Package:
1983, 240 pages, $34.95
ISBN 0-03-063979-4





Programming the IBM Personal Computer: BASIC
Neill Graham
From switching your Personal Computer on to editing text, handling random and sequential files—even making music—this easy-to-follow book shows you how.
1982, 291 pages, $17.00
ISBN 0-03-063667-1



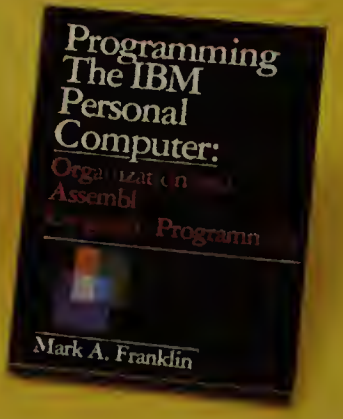
Programming the IBM Personal Computer: COBOL
Neill Graham
A spiral development and a wealth of sample programs lead you step-by-step into all features of the IBM Personal Computer's version of COBOL.
1983, 400 pages, $18.95
ISBN 0-03-060538-5



Your IBM Personal Computer: Use, Applications, and Basic
David E. Cortesi
An elementary, non-threatening introduction to the Personal Computer—set-up and testing, disk files, Visi-Calc and other software, and the rudiments of BASIC.
1982, 253 pages, $17.00
ISBN 0-03-063671-X



Programming the IBM Personal Computer: Pascal
Neill Graham
Accessible to beginners, this structured presentation shows how to program with the powerful compiler Pascal developed by IBM for the Personal Computer.
1983, 256 pages, $16.95
ISBN 0-03-061982-3



Programming the IBM Personal Computer: Organization and Assembly Language Programming
Mark A. Franklin
Examples and problems help you understand your Personal Computer at its most basic level. Master DOS, I/O, and interfacing while maximizing speed and flexibility.
1983, 400 pages, $19.95
ISBN 0-03-062862-8

PC WRITERS—Let me know your book/software ideas. —Brete Harrison, Editor, CEPP, 829 Sonoma Ave., Suite 5, P.O. Box 1180, Santa Rosa, CA 95402; (707) 544-4448.

ORDER BY PHONE . . .USE OUR TOLL-FREE 800 NUMBER!
(800) 227-1617 ext. 336 (in California, (800) 772-3545 ext. 336)

CBS
EDUCATIONAL & PROFESSIONAL PUBLISHING
383 Madison Avenue, New York, NY 10017

IBM is a registered trademark of the International Business Machines Corporation. Wordstar is a registered trademark of Micropro. Visi-Calc is a registered trademark of Visicorp. UCSD p-System is a registered trademark of the Regents of the University of California.

Reader Service #298

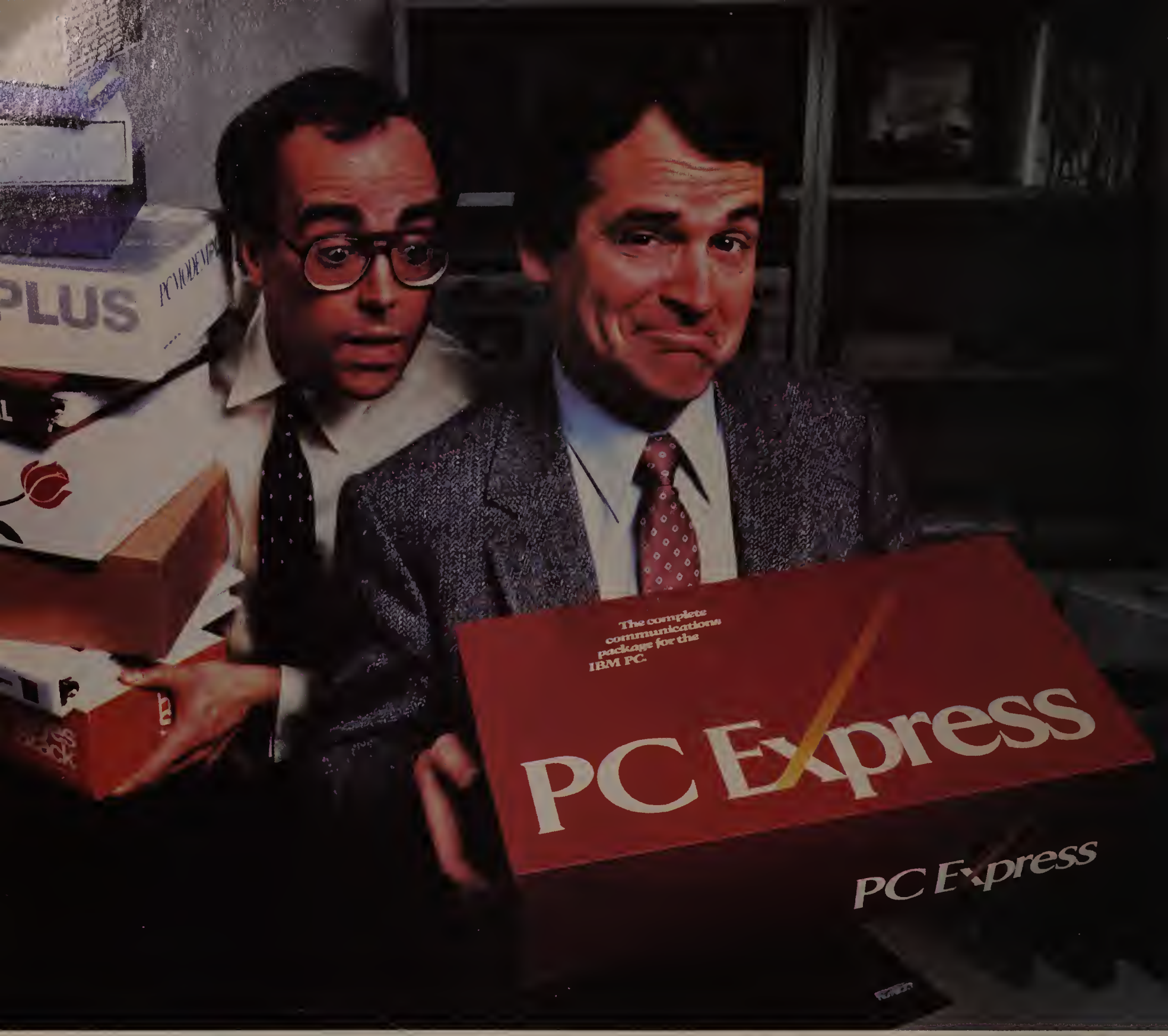
MAIL THIS COUPON TODAY!
To: Deborah Mitera
CBS Educational & Professional Publishing
383 Madison Avenue, New York, NY 10017
PLEASE SEND ME (check ISBNs of items desired):
For each order, please enclose the price, 75¢ handling, 5% for shipping, and applicable sales tax. Or ☐ we will bill you, or charge your ☐ VISA ☐ Mastercard.

NO. _____ EXP. DATE _____
SIGNATURE _____
NAME _____
COMPANY _____
STREET _____
CITY _____ STATE _____ ZIP _____
Offer valid in USA only; prices subject to change without notice.

BOOK/DISKETTE PACKAGE
☐ **0-03-063978-6 (UCSD Pascal)**
☐ **0-03-063981-6 (Wordstar)**
☐ **0-03-063982-4 (Visi-Calc)**
☐ **0-03-063979-4 (Fortran)**

BOOK
☐ **0-03-063667-1 (Basic)**
☐ **0-03-060538-5 (Cobol)**
☐ **0-03-063671-X (Use/Basic)**
☐ **0-03-061982-3 (Pascal)**
☐ **0-03-062862-8 (Assembler)**

PCW



Now, get a complete communications package in just one package.

Reader Service #272

Introducing PC Express.™

Until now, if you wanted a complete communications package for an IBM™ PC, you really had to go overboard. One board for sync and another for async communications. One for a modem. Yet another for electronic mail. You might end up filling all the expansion slots and still not fill your needs.

Now, you can get it all together with just one board—the new PC Express.

PC Express is a dynamic, interactive and powerful combination of sync, async and voice communications. It comes ready-to-use with software on diskettes, tutorials, and a pc board that easily plugs into an IBM PC or IBM-compatible computer.

It gives you complete PC-to-PC and PC-to-mainframe communications, including access to information networks such as The Source,℠ Western Union, Dow Jones News/Retrieval® and more. It puts at your command a fully integrated telephone management system with an unlimited telephone directory, full-screen text editor, auto-answering, auto-dialing from a data base, busy/ring/voice detection, on-board modem, electronic mail and more. For people who deal with people and information—brokers, marketing and sales professionals, managers—PC Express will eliminate the time you waste looking for data and make you more effective and productive than ever before.

PC Express enables your IBM PC to communicate with mainframe computers and perform DEC™ VT100/52 emulation. For added versatility, PC Express is also available with SNA, allowing your IBM PC to emulate a 3274 Cluster Controller, 327X and 3770 RJE terminals. For MIS Managers, that means you now have an effective way to reduce host processing and storage loads. And, for the first time, enjoy the productive possibilities of combining the problem solving powers of micro and mainframe software.

Specifications

Sync and async communications with IBM mainframes, and async with DEC mainframes, PCs, and information networks: The Source, Western Union, Dow Jones News/Retrieval, etc.

Modems: onboard 300 baud; external up to 19.2K baud

External connectors: RS-232C; standard RJ11 phone jacks

Telephone management capabilities:
- Data base telephone and address directory
- Full-screen text editor
- Touch tone and pulse generation line access
- Auto-connect for voice
- Auto-dial
- Busy/ring/voice detection on outgoing calls
- Auto-speaker control
- Call history file
- Voice/data switching on same call

Interrupt priority selection

Port address selection

Electronic mail with message text editor and 10-page buffer capacity

Programmable user-defined functions

Optional: SNA (327X and 3770 remote job entry emulation.)



For details and your nearest dealer, call (415) 328-2411. Why waste time and money on boards that only offer piecemeal solutions, when PC Express can fill all your communications needs without filling your IBM PC.

Intelligent Technologies

Intelligent Technologies International Corporation
151 University Avenue, Palo Alto, CA 94301 (415) 328-2411

IBM is a trademark of International Business Machines Corp. PC Express is a trademark of Intelligent Technologies International Corp. DEC is a trademark of Digital Equipment Corp. The Source is a service mark of Source Telecomputing Corp. Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

. Star-Dot-Star

A global exchange of personal computer discoveries

Edited by Andrew Fluegelman

This department continues to grow in popularity, judging from both our fan mail and the increased number of contributions. We'll keep expanding the space devoted to *.* as long as we receive encouragement to do so.

We've noticed that some of the recent submissions represent "discoveries" that may have already been discovered by other users, but which are very useful. Since there are tens of thousands of new PC users each month, we think it's worthwhile publishing tips that may be old hat to more experienced users.

If you consider yourself a novice PC user, we encourage you to read through these submissions. You'll discover some good advice from users who were novices just a month or so ago. And for the veterans, we'll continue to publish tips that delve deeply into the PC's hidden quirks and treasures.

Our lead item this month does delve deeply but can be put to good use by everyone. It's the latest installment of "The CapsLock Saga," that continuing search for the perfect remedy for the lack of indicator lights on the PC's much maligned keyboard.

Keyflags

I noted in the *.* item "Flip Lock" [*.*, *PCW*, Vol. 1, No. 4] the complicated approach to the <CapsLock> and <NumLock> problem and came up with the following alternative. KEYFLAGS is a .COM program that intercepts INT 09H (the ROM keyboard routine) and samples the <CapsLock> and <NumLock> flags to see if they are toggled. If they are it displays on the top row of the screen at columns 78 and 79 the symbols @ and # respectively if <CapsLock> or <NumLock> has been toggled. This placement integrates well with the *WordStar* ruler-line prompts. You could, of course, display the flags anywhere since that feature is under your control; they could also be displayed in any attribute. I've chosen to display them as highlighted. To keep the flags displayed when the screen scrolls, the status is refreshed after every keyboard call.

I have had no problem with this program. It has been tested with BASIC, *WordStar, EasyWriter II, VEDIT,* and *ProKey* (though it should be installed after *ProKey* is installed) and with my virtual disks (those from AST as well as the device driver version installed from DOS 2.00). I put it in an AUTOEXEC.BAT file for installation.

Morton Kaplon
Pomona, New York

You can create KEYFLAGS.COM on your system even if you don't understand how it works. Carefully type and run the BASIC program reproduced in listing "KEYFLAGS.BAS". The program will indicate whether you have successfully created the .COM file and whether there is an error in your DATA statements. For those interested in assembly language programming, the .ASM file for the program is reproduced in listing "KEYFLAGS.ASM."

We found that KEYFLAGS does not mix well with 1-2-3, *which does its own monitoring of the keyboard and displays its own keyflags. You should also be careful not to edit the top line of a program when using BASIC; otherwise you'll include the flag symbol in the line and corrupt it beyond repair. Until some reader contributes an "unflag" program, your best bet if you need to get rid of the flags is to reboot.*

Mine Field

The program reproduced in listing "MINE.BAT" is for all the readers who plow through mountains of technical information and need the relief of a short game that can be typed into the computer in a few minutes. Here it is.

Name: Mine Field

Object: To proceed as far as possible through the mine field. Your score, which is equal to the number of the mines passed, is kept on the lower-left corner of the screen.

Instructions: You are represented by a down arrow on the screen. Its movement is controlled manually by using the <CursorLeft> and <CursorRight> keys on the numeric keypad. <CursorLeft> moves you one space to the left every time the key is pressed, and <CursorRight> moves you one space to the right.

The mines are represented by stars. The game ends when you collide with a mine. Good luck.

Jean Pickett
Trenton, New Jersey

To start the game, choose the mine field density on a scale from 1 to 10. The game slows down as the density increases, but you'll need all the help you can get.

Wild Card TYPE

The DOS TYPE command doesn't accept wild cards (* or ?). To get around this, you can use the COPY command, which does accept wild cards, to copy the file(s) to the screen. Use this format:

`COPY` *filename* `CON:`

in which you supply the file name,

```
TITLE TFR24C70.ASM
PAGE 60 ,132
;
;   This program intercepts the ROM KB interrupt 09H ( Tech
;   Manual, A-25, line 1784 ) and tests every KB entry to see
;   whether CapsLock or NumLock has been toggled. If CapsLock was
;   toggled it displays the symbol @ ,and if NumLock was toggled
;   it displays the symbol #  both in enhanced video. The location
;   of the display is determined by the  Equates for row and
;   columns respectively for the two flags, and the display
;   format is determined by the equate DF for the attribute.
;   The status is determined from the flag KB_FLAG of the ROM
;   ( TM,A-2, line 69 is location ).
;
;
;   This version displays flags after every KB use at row 00, col 78.
;
;               ***  Define Constants Used by Program ***
;
KB_DATA EQU     060H    ;8259 Port with KB scancode
KB_CTL  EQU     061H    ;8259 Port with Control data for port
ROWCAPS EQU     00      ;Row for Caps Display(0-24)
COLCAPS EQU     78      ;Column for Caps display(0-79)
ROWNUMS EQU     00      ;Row for Nums display
COLNUMS EQU     79      ;Column for Nums Display
DF      EQU     15      ;Normal Intensified Display format
;
;               ************    MACRO SECTION     ************
        IF1
CSR_SET MACRO   ROW,COL ;Sets CSR Pos. on PGE 0
        MOV     DH,ROW  ;sets row
        MOV     DL,COL  ;sets col
        MOV     BH,0    ;sets pge
        MOV     AH,2    ;ROM BIOS VIDEO function
        INT     010H    ;ROM BIOS VIDEO Interrupt
        ENDM
CSR_GET MACRO           ;Return CSR Pos. on PGE 0
        MOV     BH,0    ;(DH,DL)=ROW,COL returned
        MOV     AH,3    ;Function in ROM BIOS Video
        INT     010H    ;ROM BIOS VIDEO Interrupt
        ENDM
ROMVIDEO        MACRO   CHR,NO_TIMES,ATTR     ;INT 10,Fn.10,Disp.Char.at
        MOV     BH,0    ;current Cursor Pos.BH=Page
        MOV     AL,CHR          ;Char. to be displayed
        MOV     CX,NO_TIMES     ;Char.count
        MOV     BL,ATTR ;Screen attribute,7normal,15 emhanced
        MOV     AH,9    ;Function call
        INT     10H     ;ROM VIDEO Interrupt
        ENDM            ;MACRO End
        ENDIF
;
 DATA    SEGMENT AT 40H ;ROM DATA,TM, A-2,line 59
```

(continues)

```
          ORG     17H               ;Location in ROM of
 KB_FLAG  LABEL   BYTE              ;KB_FLAG(see A-2 of Tech Man)
 DATA     ENDS
;
CSEG     SEGMENT
         ASSUME  CS:CSEG,DS:DATA
;
         ORG     100H
;
;The block of code below directs interrupt 9H to 5CH in Program Prefix
;rather than the usual location in ROM
;
START:   MOV     DX,5CH            ;Set DS:DX to locn 5CH in program prefix
         MOV     AL,9H             ;Set the KB interrupt (9H=9)
         MOV     AH,25H            ;DOS function call for interrupt
         INT     21H               ;DOS interrupt for service
         MOV     DI,DX             ;Move KB routine down so it starts
         MOV     SI,KB_ADDR        ;At locn 5CH in program prefix
         MOV     CX,KB_LNTH        ;This sets count in CX for MOVSB at FINISH
         JMP     FINISH            ;to include just operative code resident.
;
;KB Interrupt routine. Copy beginning of ROM routine to allow easy
;jump to later ROM code. Copy code from TM, A-25,line 1788(line 1787
;is inserted just before ports are sampled) to line 1808.
;
KB:      PUSH    AX                ;Save registers used
         PUSH    BX
         PUSH    CX
         PUSH    DX
         PUSH    SI
         PUSH    DI
         PUSH    DS
         PUSH    ES
         CLD
         MOV     AX,DATA
         MOV     DS,AX
         STI
         IN      AL,KB_DATA        ;Get key code
         PUSH    AX
         IN      AL,KB_CTL         ;Restore KB
         MOV     AH,AL
         OR      AL,80H
         OUT     KB_CTL,AL
         XCHG    AH,AL
         OUT     KB_CTL,AL
         POP     AX
         MOV     AH,AL             ;Save keycode
;
;End of copied ROM code. Start own code.(The part of ROM code that follows
;this is just that part which handles the KB interrupt 10H,which is what
;the DOS KB interrupts use.
;
         CMP     AL,0FFH           ;Overrun?Line 1812 of ROM
         JZ      INTERIM           ;Resting place for Near Jump
```

KEYFLAGS.ASM *(continued)*

```
;**********************  Start of Operable Code  **********************
;
;****    Routine to Test for Caps Lock and Nums lock Toggle*****
        PUSH    AX                ;Save registers not saved by Video Int
        PUSH    DI
        PUSH    SI
        MOV     BL,KB_FLAG                ;Status to BL
        AND     BL,60H                    ;Sets bits for both on
        CSR_GET                           ;need to save cursor
        MOV     CS:ROWSAVED,DH            ;Save cursor locations
        MOV     CS:COLSAVED,DL
        CMP     BL,60H                    ;see if both on, if not then
        JNE     TRY1                      ;to test for CAPS only on
        CSR_SET ROWCAPS,COLCAPS           ;both on, display
        ROMVIDEO        '@',1,DF
        CSR_SET ROWNUMS,COLNUMS
        ROMVIDEO        '#',1,DF          ;both now displayed
        JMP     HOME                      ;exit
INTERIM:JMP     ROM_KB                    ;needed for near JZ above
TRY1:   CMP     BL,40H                    ;is Caps alone on?
        JNE     TRY2                      ;if not,test for nums only
        CSR_SET ROWCAPS,COLCAPS           ;display just caps only
        ROMVIDEO        '@',1,DF
        CSR_SET ROWNUMS,COLNUMS           ;and blanks for nums
        ROMVIDEO        ' ',1,DF
        JMP     HOME                      ;exit
TRY2:   CMP     BL,20H                    ;see if just nums on
        JNE     BOTH_OFF                  ;if not, both off
        CSR_SET ROWCAPS,COLCAPS           ;blank for caps
        ROMVIDEO        ' ',1,DF
        CSR_SET ROWNUMS,COLNUMS           ;and nums is on alone here
        ROMVIDEO        '#',1,DF
        JMP     HOME                      ;exit
BOTH_OFF:       CSR_SET ROWCAPS,COLCAPS
        ROMVIDEO        ' ',1,DF          ;blank caps spaces
        CSR_SET ROWNUMS,COLNUMS           ;blank nums spaces
        ROMVIDEO        ' ',1,DF
HOME:   CSR_SET CS:ROWSAVED,CS:COLSAVED
HOME0:                                    ;no change if here,exit
        POP     SI                        ;restore registers
        POP     DI
        POP     AX
;
ROM_KB: MOV     AH,AL
        JMP     FAR PTR ROM_ADR ;To ROM for processing
;
FINISH: REP     MOVSB
        MOV     DX,DI           ;End program but leave KB resident
        INT     27H             ;DOS call for stay resident
```

(continues)

```
;*************Memory for CS must go here and be addressed CS:************
;
ROWSAVED        DB      ?       ;Row position from DH
COLSAVED        DB      ?       ;Col position from DL
;
KB_END:
;

CSEG    ENDS
;
ROM     SEGMENT AT 0F000H       ;ROM BIOS KB entry points
        ASSUME  CS:ROM
        ORG     0E9A8H          ;This is line 1812 on A-26 of TM
ROM_ADR LABEL   FAR             ;Perform all but initial processing
ROM     ENDS
;
KB_ADDR EQU     (OFFSET KB-OFFSET START)+100H
KB_LNTH EQU     (OFFSET KB_END-OFFSET KB)
;
        END     START
```


which can contain wild cards. CON: stands for console; in DOS the console represents the screen for output or the keyboard for input. When this command is issued, all applicable files are printed on the screen, each preceded by a line showing the file's name.

To make this method more convenient, you may want to make a batch file. To represent the first argument to a command in a batch file, DOS uses the variable %1. Thus, you could make a batch file like this:

```
COPY %1 CON:
```

and call it XTYPE.BAT. Now all you have to type is

```
XTYPE filename
```

Manny Farber
Landenberg, Pennsylvania

BASIC Unprotect

This series of commands will let you list a program that has been saved with the ',p' option. From DOS type BASICA or BASIC . Once in BASIC type in NEW <ENTER> ; then type DEF SEG <ENTER>. Now type

```
BSAVE "UN.P",1124,1
```

load the protected program; and type

```
BLOAD "UN.P",1124
```

Now feel free to LIST, SAVE, or EDIT the protected program. To protect a program before saving it type

```
DEF SEG:POKE 1124,255
```

Marc-David Seidel
Roslyn, New York

COMPAQ Clicks

A quick tip to fellow COMPAQ users. Although the key-click volume control commands in the COMPAQ Operations Guide do not work (<Alt>-<GrayPlus> and <Alt>-<GrayMinus>), using the <Ctrl> key in the sequence will have the desired effect. Use <Ctrl>-<Alt>-<GrayMinus> to decrease the key-click volume one step and <Ctrl>-<Alt>-<GrayPlus> to increase the volume. COMPAQ Computer Corp. please take note.

Robert Rosenbloom
Dallas, Texas

```
5 ' Run this program and create the file KEYFLAGS.COM
10 CRE$="KEYFLAGS.COM"
15 DEFINT A-Z:DIM A(16):ON ERROR GOTO 85
20 DEF FNHVAL(X$)=VAL("&H"+X$)
25 KILL CRE$
30 OPEN CRE$ AS #1 LEN=1:FIELD #1,1 AS A$
35 PRINT"Building file ";CRE$;"...
40 READ LENFIL:LIN=101
45 WHILE CHKLEN<LENFIL
50 FOR I=1 TO 16:READ X$:A(I)=FNHVAL(X$):CHK=CHK+A(I):NEXT
55 READ CHK$:IF FNHVAL(CHK$)<>CHK THEN 80
60 FOR I=1 TO 16:LSET A$=CHR$(A(I)):PUT #1:NEXT
65 LIN=LIN+1:CHKLEN=CHKLEN+16:CHK=0
70 WEND
75 CLOSE:BEEP:PRINT CRE$;" successfully created.":END
80 CLOSE:BEEP:PRINT "DATA ERROR IN LINE ";LIN:END
85 IF ERL=25 THEN RESUME 30
90 ON ERROR GOTO 0
100 DATA 330
101  DATA BA,5C,00,B0,09,B4,25,CD,21,8B,FA,BE,16,01,90,B9,739
102  DATA 34,01,90,E9,2C,01,50,53,51,52,56,57,1E,06,FC,B8,5A6
103  DATA 40,00,8E,D8,FB,E4,60,50,E4,61,8A,E0,0C,80,E6,61,8B7
104  DATA 86,E0,E6,61,58,8A,E0,3C,FF,74,50,50,57,56,8A,1E,813
105  DATA 17,00,80,E3,60,B7,00,B4,03,CD,10,2E,88,36,48,02,55B
106  DATA 2E,88,16,49,02,80,FB,60,75,34,B6,00,B2,4E,B7,00,608
107  DATA B4,02,CD,10,B7,00,B0,40,B9,01,00,B3,0F,B4,09,CD,640
108  DATA 10,B6,00,B2,4F,B7,00,B4,02,CD,10,B7,00,B0,23,B9,654
109  DATA 01,00,B3,0F,B4,09,CD,10,E9,9D,00,E9,AD,00,80,FB,6F4
110  DATA 40,75,31,B6,00,B2,4E,B7,00,B4,02,CD,10,B7,00,B0,64D
111  DATA 40,B9,01,00,B3,0F,B4,09,CD,10,B6,00,B2,4F,B7,00,5C4
112  DATA B4,02,CD,10,B7,00,B0,20,B9,01,00,B3,0F,B4,09,CD,620
113  DATA 10,EB,65,90,80,FB,20,75,31,B6,00,B2,4E,B7,00,B4,752
114  DATA 02,CD,10,B7,00,B0,20,B9,01,00,B3,0F,B4,09,CD,10,57C
115  DATA B6,00,B2,4F,B7,00,B4,02,CD,10,B7,00,B0,23,B9,01,645
116  DATA 00,B3,0F,B4,09,CD,10,EB,2F,90,B6,00,B2,4E,B7,00,673
117  DATA B4,02,CD,10,B7,00,B0,20,B9,01,00,B3,0F,B4,09,CD,620
118  DATA 10,B6,00,B2,4F,B7,00,B4,02,CD,10,B7,00,B0,20,B9,651
119  DATA 01,00,B3,0F,B4,09,CD,10,2E,8A,36,48,02,2E,8A,16,463
120  DATA 49,02,B7,00,B4,02,CD,10,5E,5F,58,8A,E0,EA,A8,E9,78F
121  DATA 00,F0,F3,A4,8B,D7,CD,27,00,00,00,00,00,00,00,00,4DD
```

KEYFLAGS.BAS

```
10 DEFINT A-Z:WIDTH 40:KEY OFF:M=1
20 S=20:T=-18:CLS
30 LOCATE 2,1:INPUT "Minefield density (1-10):",M$
40 IF VAL(M$)<>0 THEN M=VAL(M$)
50 COLOR 3,0:LOCATE 23,1:PRINT "|";:LOCATE 23,39:PRINT "|"
60 COLOR 6,0:FOR I=1 TO M:X=RND*36+2:LOCATE 23,X:PRINT CHR$(15);:NEXT
70 T=T+1:LOCATE 25,1:PRINT T:I$=INKEY$
80 IF I$=CHR$(0)+CHR$(77) THEN S=S+1:SOUND 1000,.5 ELSE IF
     I$=CHR$(0)+CHR$(75) THEN S=S-1:SOUND 1000,.5
90 P=SCREEN(5,S):IF P<>32 AND P<>0 THEN 110
100 COLOR 4,0:LOCATE 5,S:SOUND 200,.5:PRINT CHR$(25):GOTO 50
110 IF S>5 THEN S=S-5
120 COLOR 5,0:LOCATE 5,S:PRINT "<<< ZAP! >>>";
130 FOR X=1000 TO 1900 STEP 100:SOUND X,.5:NEXT
140 FOR X=1 TO 10:SOUND 500,.5:SOUND 1000,.5
150 FOR DV=1 TO 100:NEXT DV:NEXT X
160 LOCATE 25,1:COLOR 0,7:PRINT "SCORE:";T;:COLOR 7,0
170 LOCATE 24,1:WHILE INKEY$<>"":WEND
180 PRINT"Press 'P' to play again...";
190 Q$=INKEY$:IF Q$="" THEN 190
200 IF Q$="P" OR Q$="p" THEN 20 ELSE END
```

MINE.BAS

Another Set of WordStar Patches

In the past *.* [*PCW*, Vol. 1, No. 1, 2, 4, and 6] has provided patches that are extremely helpful in modifying *WordStar* for your custom applications. Here are a few other hints.

Few people know how easy it is to alter the contents of *WordStar* messages provided on the menus. This requires using DEBUG in the ways described in *PC World* [Vol. 1, No. 2 and 3]. Most of the messages provided on the *WordStar* menus are contained in file WSMSGS.OVR. Just use DEBUG to dump (using the D command) the contents of each menu and then change the contents accordingly. For example, typing D162B reveals the hex code for 'Other Ribbon Color' on the Print Menu. If you have patched the ^P^Y function on your printer for, say, italics, the words "Italics Font" can be substituted into the Print Menu by typing E162B and then entering the hex code for "Italics Font" (49_74_61_6C_69_63_73_20 _66_6F_6E_74_20_20_20_20 _20_20). The extra 20s (spaces) must be used to pad out the space previously occupied by the last four letters of 'Other Ribbon Color'. Similarly, typing D4C6 reveals the code for the opening menu, ridiculously entitled NO-FILE MENU. This can be changed to OPENING MENU (duplicating one of the changes on *WordStar 3.3*) by simply modifying the code.

Another secret of *WordStar* is that if the hex values of displayed characters in *WordStar* menus are changed appropriately, they can be made individually into boldface or normal-intensity characters. I patched my *WordStar* to present normal type in normal intensity with blocks represented in high intensity. Intuitively, this seems better; however, one drawback is that the top screen banner (listing file name, page, line, and column numbers, as well as the INSERT ON message) is written entirely in high-intensity characters. This is visually distracting. Using the DEBUG techniques described above, you can set these messages in high or normal intensity. For example, I made PAGE, LINE, COL, and INSERT ON normal intensity using the following procedure:

Type DEBUG WSOVLY1.OVR (this file contains only a few of the *WordStar* messages). Typing D4320 reveals the hex code for PAGE, LINE, COL, and INSERT ON.

To alter the intensity attribute, find the hex value for each character

```
30000    '                  REBOOT
30001    '     This routine will cause an IBM PC
30002    ' to execute a power-on reboot. This has
30003    ' been tested with both DOS 1.10 and 2.00.
30004 DEF SEG=&HF000:RB=&HE05B:CALL RB
```

REBOOT.BAS

when that character's ASCII value is added to 128. For example, standard *WordStar* contains the hex code 50_41_47_45_ for PAGE. Adding 128 to each character's ASCII values and taking the hex value yields D0_C1_C7_C5. These new values can then be plugged in with DEBUG. I still haven't found the locations for ruler-line generation or for the file name, so perhaps another reader could pass these along.

Alan J. Fridlund
Pleasant Hill, California

BASIC Reboot

*The final item of *.*, contributed by Mark Anaker of Everett, Washington, is a BASIC one-liner that will cause a PC to execute a power-on reboot (see listing "REBOOT.BAS"). We're sure some reader will come up with a practical application for this intriguing program.*

---

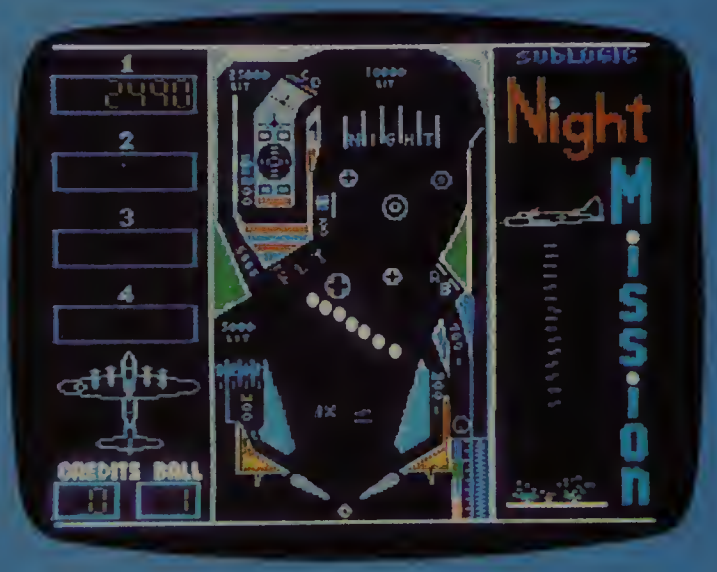
*Join the *.* global exchange. We'll pay $25 to $100 for each item published. Send your personal computer discoveries to* PC World, *555 De Haro St., San Francisco, CA 94107, or electronically to CompuServe 74055,412 or Source STE908.*

INTRODUCING

PINBALL FOR THE IBM PC

- In the beginning came the onrush of new computer pinball simulations. Then came SubLOGIC's "Night Mission" Pinball by Bruce Artwick.
- And the rush was over.
- Pinball was so beautifully crafted, so physically correct, so "complete" and yet so variable, that it stood out well above the competition.
- This pure example of programming perfection is now available for the IBM PC. More than just a masterful display piece for your Personal Computer, Pinball also remains the ultimate in fun.

On IBM PC 64K disk. Requires the IBM Color/Graphics Monitor Adapter. Supports RGB, B&W, and color monitors.



subLOGIC Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995

See your dealer...

or for direct orders enclose $39.95 plus $1.50 for shipping.
Please specify UPS or first class mail delivery.
Illinois residents add 5% sales tax. Visa and MasterCard accepted.

Reader Service #308

Your IBM® was a personal computer until MultiMate™ came along.

Now, it becomes a Dedicated Word Processor.

MultiMate comes with toll-free support to registered end users. It comes with 180 days of enhancements free of charge. (Psst . . . pass the SoftWord . . . there's a speller coming.) And, in the event that MultiMate doesn't suit your needs, we offer a 30-day money back guarantee. Call us today for information on dealers in your area.

- User friendly.
- Merge capability.
- Minimal training time.
- Same fast, full screen response as larger systems.
- Documents organized by page.
- Help screens readily available during document creation and modification.
- Automatic underlining on the screen.
- Complete, easy-to-use documentation.
- Completely, key (not command) driven.
- Automatic onscreen page reorganization

SoftWord Systems, Inc.
52 Oakland Avenue, North
East Hartford, CT 06108
(203) 263-0131 or (800) 243-4646



MULTIMATE

IBM is a registered trademark of IBM Corporation
MultiMate is a trade mark of Softword Systems Inc
Reader Service #396

ANNIVERSARY SALE

SPECIAL SAVINGS ON SELLUM SERIES PRINTERS

SELLUM N-35



- The Fastest Letter-Quality Printers in the World!
- Unequalled Flexibility in Hardware and Software Interfacing!
- Designed for use with IBM Serial or Parallel Interfaces!
- Reliability Plus...

SELLUM Adds Proprietary Firmware to Reliable NEC Printers

- 16K or 48K Spooling Buffer
- Advanced Logic Seeking
- Switch Selectable Protocols
- Universal Hardware Interfacing
- Switch Selectable Baud Rate to 19,000 Baud
- Full Function Front Panel
- Auto Reprint
- Full 90 Day Warranty

SELLUM N-77



SELLUM's Intelligent Letter-Quality Printers Provide ALL-IN-ONE Compatibility, Reliability, and Serviceability.

- Intelligent buffering eliminates wasted space, maximizes throughput
- Perfect for office automation—eliminates the need for additional peripherals—**No external boxes necessary**
- No special protocols or software needed
- State of the Art for industrial standards
- National service available

SAVE $500 — SELLUM N-35

Was $2495.00
Now ... **1995.00**

SELLUM N-77 — **SAVE $800**

Was $3295.00
Now ... **2495.00**

★ NOW IN STOCK ★ OVER 3 YEARS FIELD EXPERIENCE

CALL NOW! (408) 946-9041

UNIQ MANUFACTURING COMPANY

780 Charcot Ave. San Jose, CA 95131

"Integration for Tomorrow's Technology"

Reader Service #84

Dealer Inquiries Invited

ADVANCED COMPUTER PRODUCTS

Serving Computer Professionals Since 1976

HOOKED ON IBM PC



If You're Thinking IBM PC™,

READ THIS!

"COEX"

MEMORY AT UNREAL! PRICES

Set of (9) 4164 64K RAMs $50.00

64K w/serial parallel clock-calendar exp. to 256K **$249.00**

256K version **$399.00**

PLUS! . . .with Purchase of either Memory card above

SUPERCALC™.....only $99.00 (195.00 value)
Disk Emulator ..... FREE
Print Spooler ..... FREE

ACP PC "FEATURE OF THE MONTH"

1. **DISKMASTER™**. Disk Controller for IBM PC or XT adds both 5¼" and 8" floppy drives. Complete with Software. Same card can also handle the Amlyn 6.2 Mb Cartridge Add-on Subsystem ..... List $299 ACP $229

2. **AST** "I/O Plus II™". Popular I/O card when fully populated has (2) Serial, (1) Parallel, (1) Game Port and Clock Calendar. Specially priced in two configurations: List ACP
   A. P/N I/O (Clk, S)..... 165 125
   B. P/N I/O-SP (Clk, 2-S, P) 265 229

3. **M&R** "SUP'R EXTENDER™". IBM PC & XT Expansion Chassis with (6) Slots, Power Supply and Fan. Your price!!! only **$439.00**. You cannot afford to live without one.

HARDWARE

	List	ACP
ABM		
BSR-X10 Interface	$95	$85
Color to Mono I/O Module	95	85
Telephone Receptionist adapt	995	875
PS3276/Bisyn Emulator	1295	1150
AST Megaplus™ Card		
P/N MG064 (64K, S, C)	395	285
P/N MG064SP (64K, 2-S, P, C)	495	349
P/N MG256 (256K, S, C)	695	469
P/N MG256SP (256K, 2-S, P, C)	795	519
•**Comboplus™ Card**		
P/N MC-064SPC (64K, S, P, C)	395	285
P/N MC-256SPC (256K, S, P, C)	695	549
•**Diskplus™ Card**		
P/N MD-064 (64K, C, S, Host)	655	495
•**PC I/O Plus II™ Card**		
P/N I/O (C, S)	165	125
P/N I/O-SP (C, 2-S, P)	265	229
P/N I/O-SPG (C, 2-S, P, G)	315	259
COEX Extender Card	40	29
Prototype Card	69	42
37 Pin "D" Connector	19	8
Snap-in Card Guides (5)	8	5
CORONA Hard Disk System		Call
CORVUS Hard Disk System		Call
DAVONG (Internal)		
5 Mb Hard Disk		1475
12 Mb Hard Disk		1775
15 Mb Hard Disk		2250
21 Mb Hard Disk		2540
32 Mb Hard Disk		2950
MAYNARD Disk Driva Card		
Floppy Card w/Parallel	295	249
Floppy Card w/Serial	325	260
MOUSE SYSTEMS Mouse for IBM		285
MICROSOFT Mouse plus Multifool		Call
ORCHID		
Hi-Res Graphics Adaptor	495	429
PERSYST Spectrum (64-256K)		
P/N SP64, (64K, Clk, S, P)		375
PLANTRONICS Color plus™ Card		399
QUADRAM Quadboard (64-256K)		
P/N Q64, 64K w/4 functions	395	329
QuadLink Apple Card	680	599
RIXON PC212A Modem I/O	596	449
TANDON TM 100-1 (160K)	295	195
TM 100-2 (320K)	395	259
TG PRODUCTS Joystick	65	49
Track Ball	65	52
VISTA "Multicard™" (exp. 64-256K)		
P/N V-064 (64K, Clk, S, P)	395	279
P/N V-256 (256K, Clk, S, P)	695	449
•**"Maxicard™" (up to 576K)**		
P/N V-576-64K		299
P/N V-576-576K		989
•**"PC Master"** (10 I/O)	495	389
•**"PC Extender"** (up to 10 I/O)	249	199
•**"Diskmaster"**	299	229
•**8" Thinline Dual Floppy**		1495
•**V1200 6.2 Cartridge Drive**		1349
XEDEX Baby Blue CP/M	600	495

PRINTERS

COEX 80F/T 80cps	$349	$249
STAR MICRONICS - NEW!		
Gemini 10X 120cps	399	319
Gemini 15 15"	599	469
OTC Daisywhl w/48K Buf	1450	1049
EPSON MX80	645	429
MX80F/T	695	499
MX100	895	649
FX80	699	549
INTEGRAL DATA		
Microprism 480	799	689
Prism 80 Color (all)	1795	1495
Prism 132 Color (all)	1995	1685
BROTHER HR-1	1195	895
Daisywriter	1495	1295
IBM PC to EPSON Cable	60	45
OKIDATA Microline 82A	599	459
Microline 83A	899	699
Microline 84AP	1399	999
Microline 92A	699	549
Microline 93A		999

MONITORS

AMDEK CORP		
300 Green 12"	$199	$155
310 Amber 12"	210	175
Color I Composite	399	339
Color II RGB Hi-Res	899	Call
Color II RGB Comm'l		Call
Color IV RGB Analog	1299	Call
NEC 12" Green-**NEW**	199	155
NEC 12" RGB (690x230)	895	799
PRINCETON GRAPHICS		
RGB IBM Lookalike	700	599

DISKETTES for IBM PC

DYSAN 5¼" SS SD	10/$55	$38
DYSAN 5¼" DS SD	10/65	48
IBM 5¼" SS SD	10/60	43
IBM 5¼" SS DD	10/65	47
VERBATIM 525-01 SS	10/45	23
VERBATIM 550-01 DS	10/55	34
MAXELL MD1 SS	10/50	29
MAXELL MD2 DS	10/60	39
Flip Box 5¼" (80 disks)		19
BULK SPECIAL SS	10/25	19
With Sleeve and Box	100/195	149

MORE IBM GOODIES

CURTIS PC Pedestal	$80	$64
Extension Cable	50	44
Keyboard Ext. Cable		34
INTEL 8087 IC		199
RAM EXPANSION		
16K Motherboard (16 IC's)		19
64K Memory Exp. (9 IC's)		50
KRAFT IBM Joystick	70	49
IBM Paddles	50	40

SOFTWARE

dBASE II
$445.00

SuperCalc
$129.00

SuperCalc 2
$179.00

Multiplan
$189.00

Wordstar
$299.00

Lotus 1-2-3
Call!

T. K. Solver!
Call!

Flight Simulator
$45.00

Context MBA
Call!

Computer Inovations C86C Compiler
$369.00

Copy II Plus
$32.00

Visiword
$289.00

Digital Research

Pascal MT+86	$295.00
Concurrent CP/M 86	260.00
CBASIC 86	149.00

Plus More Great Software Values In Our 1983 Catalog! Send For Your Copy NOW.

TRAINING for IBM PC

•Interactive Training Disks•
•Step by Step in English•
•Handy Reference Guide•

PLAN POWER-Visicalc	75	59
PLAN POWER-Supercalc	75	59
PLAN POWER-Multiplan	75	59
DB POWER-dBase II	75	59
POWER PACK-Wordstar	75	59
ATI POWER-IBM DOS	75	59
BASIC POWER-IBM MBASIC	75	59

MODEMS

SIGNALMAN Mark I (RS232)	$99	$79
HAYES Smartmodem (RS232)	289	225
Smartmodem 1200	699	549
IBM PC to Modem Cable	40	30
SSM 1200 Baud		529

FLOPPY DISKS FOR IBM PC

TEAC DSDD (320K) **$289**
TANDON TM-100-2 ..... **$259**
SHUGART DSDD (½" high).... **$279**
QUME DSDD (½" high)..... **$249**

(External Case and Power Supply Also Available)

TERMS: MO Cashier's Check Bank Wire. Personal checks allow 2 weeks for processing. Include Drivers License and credit card #s Visa, AMEX. CB add 3% service charge. Add 3% shipping & handling or $2.50, whichever is greater. Add 10% for foreign orders or US Parcel Post. Include Telephone number. NO CODs. Prices subject to change without notice. Some items subject to prior sale. We reserve the right to substitute manufacturer. Retail prices may vary. We are not an authorized IBM dealer. IBM™ trademark of International Business Machines.

MAIL ORDER: P.O. Box 17329 Irvine, CA 92713
Retail: 1310 E. Edinger, Santa Ana, CA 92705
(714) 558-8813
542 W. Trimble, San Jose, CA 95131
(408) 946-7010

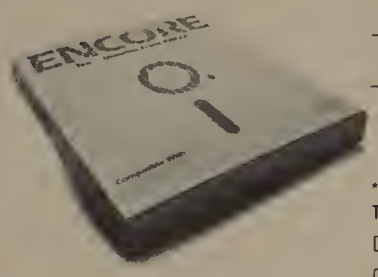
TOLL FREE
800-854-8230
TWX
910-595-1565

64K MEMORY + P.S.C. $249.00

AVAILABLE NOW! — LOW COST MEMORY — SEND FOR YOUR FREE 1983 CATALOG!

Available only from Inmac!

Send today for your Encore™ diskettes and free Floppy Library Case. Or call toll-free 1(800)547-5444.



In California 1 (800) 547-5447.

This offer good only in the Continental U.S.
Allow one to two weeks for delivery.

Fill out name and address on reverse side.

Be sure to include with my order one free Floppy Library Case for each box of diskettes. (Limit 4 per order.)

No. of boxes	Order No./Description	Price per box of 10 diskettes 1	2-3	4+
_____	7970 5-1/4" SSSD soft sector	$25.90 (2.59 ea)	$19.90 (1.99 ea)	$15.90 (1.59 ea)
_____	7971 5-1/4" DSDD soft sector	$43.90 (4.39 ea)	$35.90 (3.59 ea)	$29.90 (2.99 ea)
_____	7960 8" SSDD soft sector	$39.90 (3.99 ea)	$29.90 (2.99 ea)	$26.90 (2.69 ea)
_____	7961 8" SSSD soft sector IBM 2305830	$32.90 (3.29 ea)	$24.90 (2.49 ea)	$19.90 (1.99 ea)

Subtotal _____
Sales Tax* _____
Total Order _____

*Customers in CA, CO, DC, NJ, NY, TX, IL, GA add applicable tax.

☐ Check enclosed ☐ Bill Company P.O. No. _____

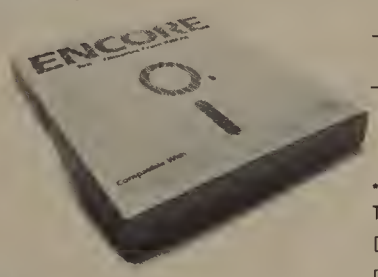
☐ Visa ☐ MasterCard Account No. _____

_____
Signature Bus. Phone

503103B

Available only from Inmac!

Send today for your Encore™ diskettes and free Floppy Library Case. Or call toll-free 1(800)547-5444.



In California 1 (800) 547-5447.

This offer good only in the Continental U.S.
Allow one to two weeks for delivery.

Fill out name and address on reverse side.

Be sure to include with my order one free Floppy Library Case for each box of diskettes. (Limit 4 per order.)

No. of boxes	Order No./Description	Price per box of 10 diskettes 1	2-3	4+
_____	7970 5-1/4" SSSD soft sector	$25.90 (2.59 ea)	$19.90 (1.99 ea)	$15.90 (1.59 ea)
_____	7971 5-1/4" DSDD soft sector	$43.90 (4.39 ea)	$35.90 (3.59 ea)	$29.90 (2.99 ea)
_____	7960 8" SSDD soft sector	$39.90 (3.99 ea)	$29.90 (2.99 ea)	$26.90 (2.69 ea)
_____	7961 8" SSSD soft sector IBM 2305830	$32.90 (3.29 ea)	$24.90 (2.49 ea)	$19.90 (1.99 ea)

Subtotal _____
Sales Tax* _____
Total Order _____

*Customers in CA, CO, DC, NJ, NY, TX, IL, GA add applicable tax.

☐ Check enclosed ☐ Bill Company P.O. No. _____

☐ Visa ☐ MasterCard Account No. _____

_____
Signature Bus. Phone

503103A

Name

Firm

Address

City State Zip

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO 1053 SANTA CLARA, CA 95051

POSTAGE WILL BE PAID BY ADDRESSEE

inmac

Encore Introductory Offer
2465 Augustine Drive
Santa Clara, CA 95051

Name

Firm

Address

City State Zip

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO 1053 SANTA CLARA, CA 95051

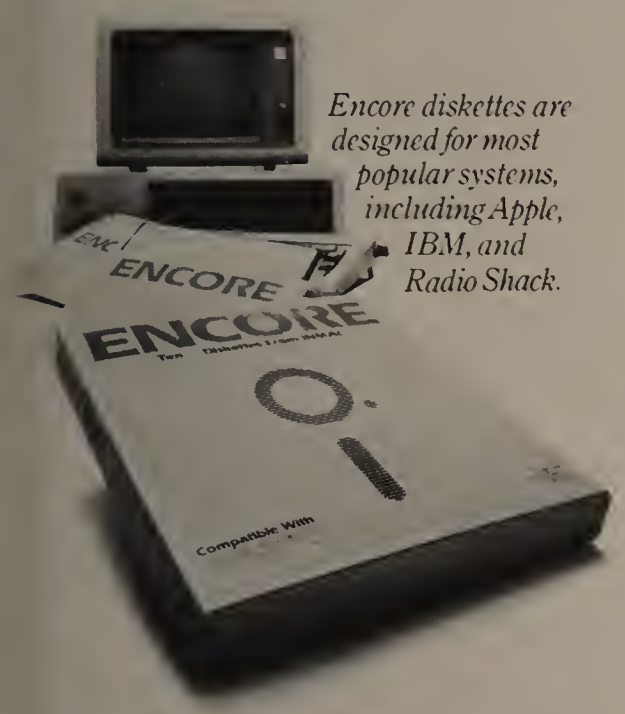
POSTAGE WILL BE PAID BY ADDRESSEE

inmac

Encore Introductory Offer
2465 Augustine Drive
Santa Clara, CA 95051

Announcing the Encore™ diskette.

The way it performs, you'd never guess it costs only $1.59.*



Encore diskettes are designed for most popular systems, including Apple, IBM, and Radio Shack.

From Inmac, the world's leading source of computer supplies and accessories, comes Encore – your best value in diskettes today.

New Encore meets the same high standards that big-name brands meet – 100% error-free performance, ANSI certification. In many cases it actually exceeds system requirements. There's even a 1-year replacement guarantee.

Encore Price Compatibility Table

No	Description	System Compatibility	Price Per Box (units of 10) 1	2-3	4 +
7970	5¼" single-side, single-density; soft sector	IBM PC (single-side), Apple II, IIPlus, IIe, III; Radio Shack TRS-80, Osborne PC	$25 90 (2 59 ea)	$19 90 (1 99 ea)	$15 90 (1 59 ea)
7971	5¼" double-side, double-density, soft sector	Cromemco Z2H, HP 85, Series 9826A, 9836, IBM PC (dual side)	$43 90 (4 39 ea)	$35 90 (3 59 ea)	$29 90 (2 99 ea)
7960	8" single-side, double-density, soft sector	Radio Shack TRS-80 Model II, Altos 2	$39 90 (3 99 ea)	$29 90 (2 99 ea)	$26 90 (2.69 ea)
7961	8" single-side, single density; soft sector; IBM Format 2305830	DEC (all systems except RX02, RX50, WS80, PDP11), HP-300	$32 90 (3 29 ea)	$24 90 (2 49 ea)	$19 90 (1 99 ea)

Encore diskettes: important savings on the one hand – accurate, reliable performance on the other. Available only from Inmac.

*Price for one SSSD 5¼" Encore diskette when purchasing 40 or more diskettes.

Reader Service #224

Yet the cost is as low as $1.59 for single-sided, single-density 5¼" Encore diskettes (when you purchase four or more boxes, ten diskettes per box).

And only $2.99 for double-sided, double-density 5¼" Encore diskettes.

Important savings; reliable performance

With low-cost, highly reliable Encore diskettes, you can easily afford the security of back-up disk storage. You can make the job of organizing data faster and easier by dedicating one diskette to a file.

You can perform any number of applications, on most popular systems: Apple II, II Plus, IIe, III; IBM PC; Radio Shack TRS-80; DEC; HP; Wangwriter and many others.

So why store your data on more expensive diskettes that don't do more for the money? From now on get accurate, reliable performance without the high cost. Get Encore.

Send coupon today. Or call

1(800) 547-5444.

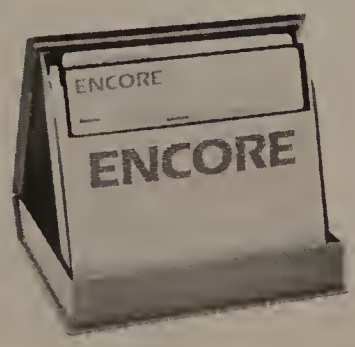
In California 1 (800) 547-5447.

Use the accompanying table to find the type and price of the Encore diskettes compatible with your system. Call toll-free if your system is not listed.

To ensure your complete satisfaction, Encore diskettes are covered by a 45-day risk-free trial as well as a 1-year replacement guarantee.

This offer good only in the Continental U.S. Allow one to two weeks for delivery.

Get an Inmac Floppy Library Case absolutely free!



For every box of Encore diskettes you order within the next 30 days, you'll receive a free Floppy Library Case. Order two boxes, get two cases. Order more, get more. (Limit 4 per order)

But act now as supplies are limited.

You'll find the Floppy Library Case a convenient way to organize and protect your data. Each case sits right on your bookshelf, protecting up to ten flexible disks from cupping, curling, and contaminants that can harm their performance and ruin your data.

High-impact polypropylene insets and fan tabs combine with a handy pop-up feature to give you fast, easy retrieval of the disks you need. And ID labels on the spine help you keep your floppies in order.

FOR A LIMITED TIME ONLY!

inmac™

World's leading source of computer supplies and accessories.



ORDER NOW Mail to Inmac, Encore Introductory Offer, 2465 Augustine Drive, Santa Clara, CA 95051

Yes, I think Encore sounds like a great deal. Please send me.

No of boxes	Order No	Description	Price per box of 10 diskettes (see table)	Multiply No. of boxes by box price
____	7970	5¼" SSSD soft sector	____	____
____	7971	5¼" DSDD soft sector	____	____
____	7960	8" SSDD soft sector	____	____
____	7961	8" SSSD soft sector IBM format 2305830	____	____
			Subtotal	____
			Sales Tax*	____
		*Customers in CA, CO, DC, NJ, NY, TX, IL, GA add applicable tax	Total Order	____

☐ Check enclosed ☐ Bill company P.O. No. ____

☐ Visa ☐ MasterCard Account No. ____

Signature ____

Name ____ Phone ____

Firm ____

Address ____

City ____ State ____ Zip ____

☐ Please send me a free Inmac catalog 503104

Now...Supercharged communications software for your high powered 16 bit PC.

The makers of CROSSTALK proudly announce the newest entry into our line of high performance communications software. CROSSTALK XVI — a communications program with the speed and features of a fine racing machine. Shift from status display to incoming communications and back again at full throttle. Drive smoothly through the program with CROSSTALK XVI's integrated help system. Enjoy the full use of function keys. CROSSTALK XVI can be used with most autodial modems, and emulates several of the most used terminals. Test drive CROSSTALK XVI today at your local dealer.



CROSSTALK™ XVI

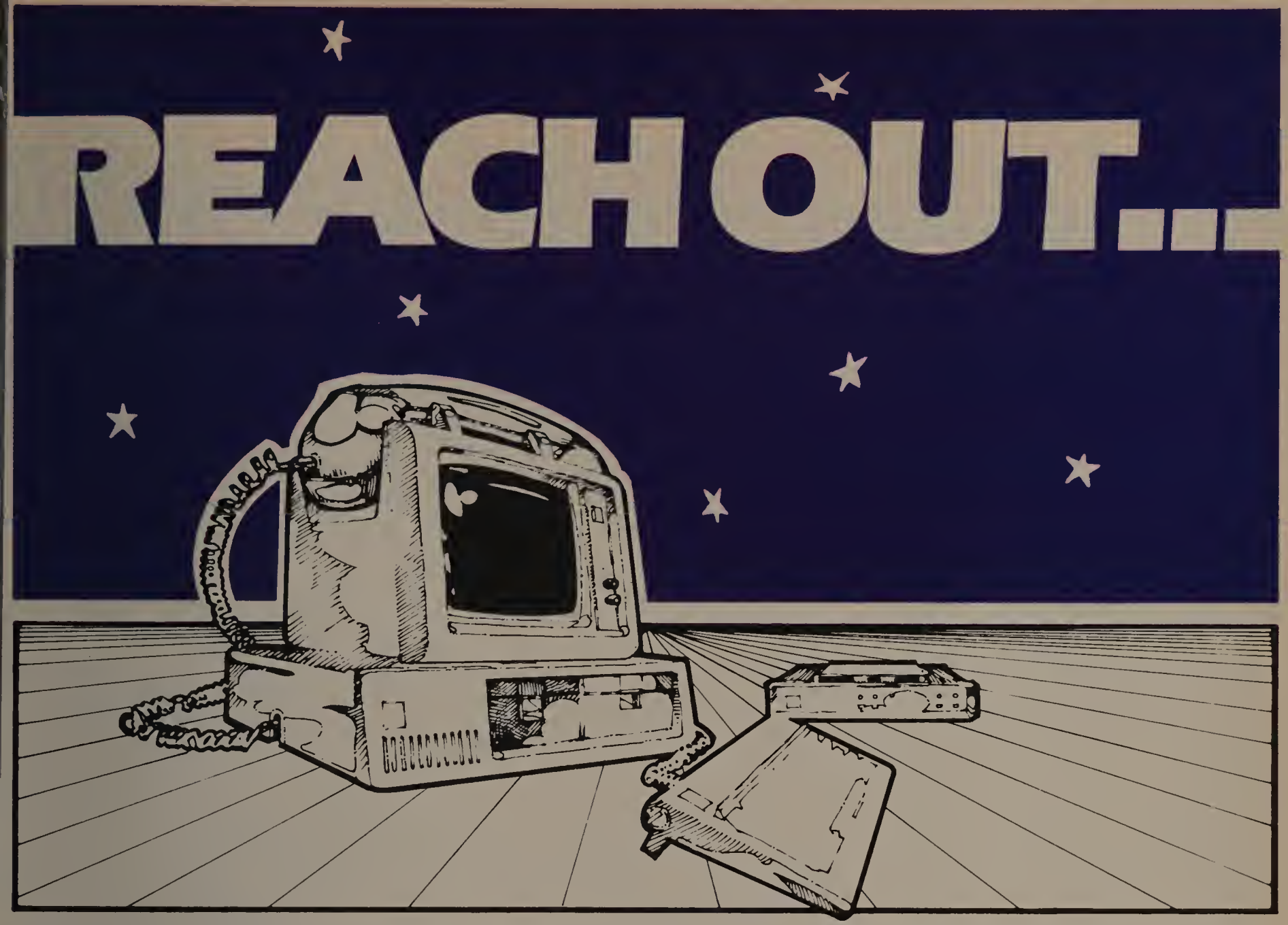
MICROSTUF®

1845 The Exchange / Suite 140 / Atlanta, Georgia 30339 / (404) 952-0267

Dealer orders call toll-free (800) 241-6393

CROSSTALK XVI is a trademark of Microstuf, Inc.

Reader Service #275



With AUTOMATED TELEMARKETING

Introducing the Personal Computer Automated Telemarketing system from Arlington Software+Systems.

Now even the smallest business can benefit from telemarketing without special telephone equipment or service. PCAT is a highly efficient system for managing and scheduling the phone calls that are so important to your success.

PCAT IS FLEXIBLE

- Telephone Sales
- Lead Qualification
- Customer Service
- Surveys
- Receivables Collection
- Inquiries
- Fund raising

PCAT IS EFFICIENT

- Stores customer or client information
- Schedules out-going calls by date and time
- Reschedules busy/no answer calls
- Automatic dialing of local, long distance and network calls
- Built in word processor for order confirmation, letters or memos
- Prompter scripts for consistently effective sales or service

PCAT IS COST EFFECTIVE

You'll be surprised just how cost effective PCAT can make your new or existing telemarketing operation. PCAT reduces your marketing costs, increases productivity and ensures that every contact can be followed up by callback, confirmation, or order entry.

PCAT IS EASY TO USE

In addition to automatic scheduling and dialing, PCAT uses function key prompts and help screens to guide you through the program. A comprehensive User's Guide is provided.

WHO NEEDS PCAT?

- Retailers
- Insurance Agents
- Stock, bond and commodity brokers
- Wholesalers and distributors
- Customer service or support depts.
- Real estate agents
- Accounts receivables depts.
- Collection agencies, etc.

HARDWARE REQUIREMENTS

IBM Personal Computer with 128k, at least one diskette drive, 80 column monochrome or color monitor, and a Hayes Smartmodem or Novation Smart-Cat. Printer is recommended.

PCAT™ is a trademark of ARLINGTON Software+Systems, IBM is a trademark of International Business Machines; Hayes Stack Smartmodem is a trademark of Hayes Microcomputer Products, Inc.
Smart-Cat Modem is a trademark of Novation Inc.

Arlington Software+Systems, 97 Bartlett Ave. Arlington, MA 02174 (617) 641-0290

Reader Service #14

☐ Have someone call me: I'm interested.
☐ Please send me written information.

NAME: _____

ADDRESS: _____

CITY: _____

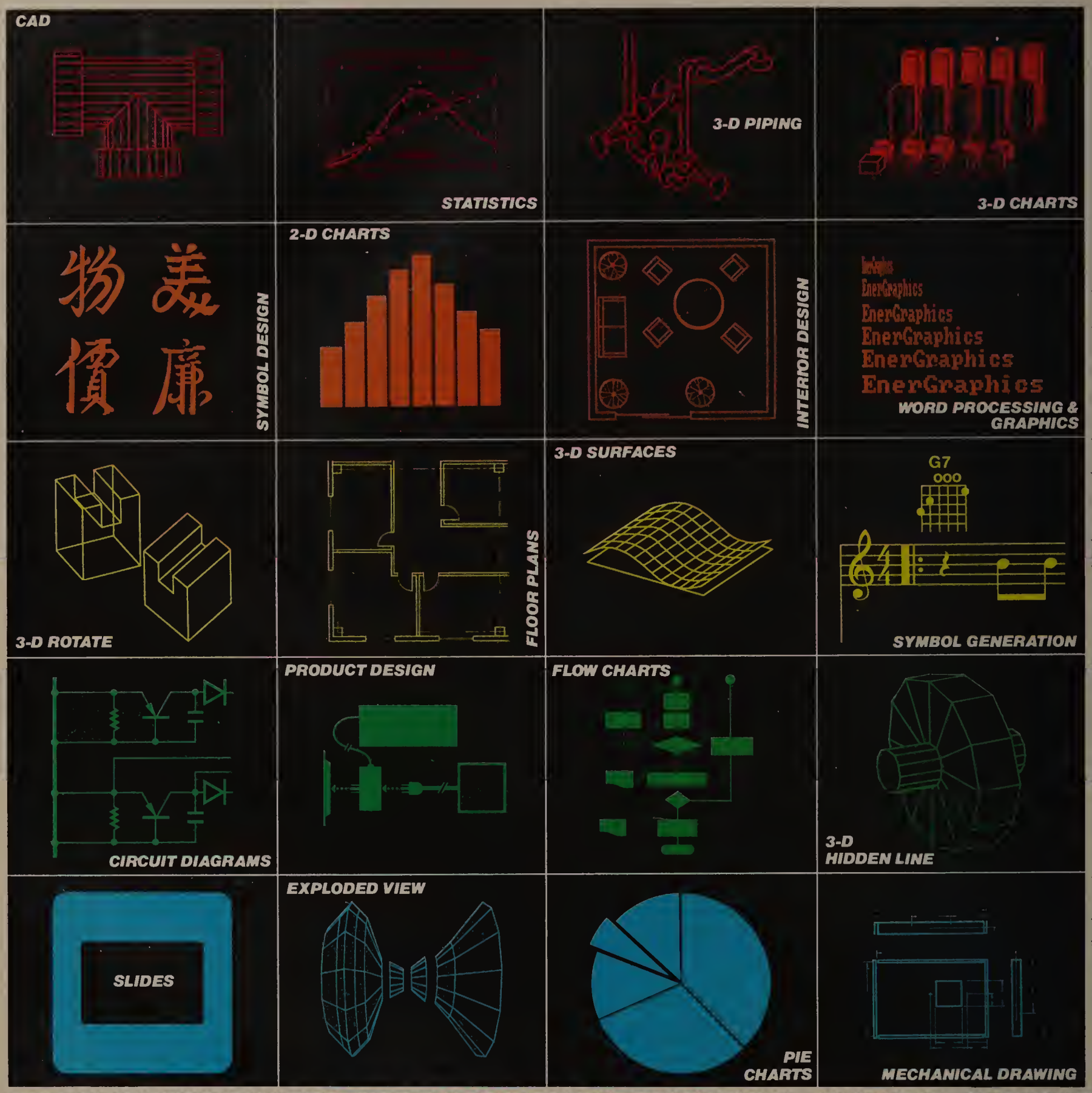
STATE: _____ ZIP: _____

PHONE #: ( ) _____

ARLINGTON
Software+Systems
97 Bartlett Ave.
Arlington, MA 02174
(617) 641-0290

NOW, 3-D ON YOUR PC

THE FIRST INTERACTIVE BUSINESS & 3-D GRAPHICS PROGRAM FOR THE IBM-PC*



*HARDWARE CONFIGURATION: IBM-PC; 64K; Dual Disk Drive; Graphics Adapter; Dot Matrix Printer. Also available for the TI-PC, Compaq, and Victor.

FOR BUSINESS CHARTS, PRODUCT DESIGN, STATISTICAL ANALYSIS, CAD/CAE

ENERGRAPHICS™

FINANCIAL ANALYSTS, BUSINESS MANAGERS, ARCHITECTS, CITY PLANNERS, BUILDERS, DEVELOPERS, ENGINEERS (ELECTRICAL, MECHANICAL, CHEMICAL, AND CIVIL), PRODUCT DESIGNERS, SCIENTISTS, TEACHERS AND STUDENTS.

SEND YOUR CHECK FOR $250 PLUS $5 SHIPPING OR $15 FOR OUR DEMONSTRATION DISK OR SEND FOR OUR DETAILED ENERGRAPHICS BROCHURE. (VISA AND MASTER CARD ACCEPTED) CALL 800-325-0174 EXCEPT MISSOURI

Reader Service #309

ENERTRONICS

Enertronics Research, Inc.
150 N. Meramec • Suite 207 • St. Louis • MO 63105 • (314) 725-5566

Famous "Blues" Guess Who's



Famous actor with those "Baby Blues" and a taste for salad dressing.



Famous 18th century painting.



Famous baseball player.



Powerful CPM co-processor.



Famous entertainer, singer and actor with the nick name Ol' Blue Eyes.



Famous "Big Blue."

The Guessing Game Stops Here.

It's the Z-80 microcomputer you plug into your IBM PC to gain instant access to thousands of CP/M programs . . . languages, programming utilities, and the world's largest library of applications.

No Guesswork in How to Use.

Just plug **Baby Blue** into any expansion slot, run the CONVERT utility, and your CP/M-80 programs execute transparently in your PC. You don't have to worry about which disks are CP/M disks and which are PC-DOS.

Offering you Total File Compatibility.

Your CP/M programs read and write PC-DOS files, so that CP/M and PC-DOS programs can share data with each other. And when you're not using **Baby Blue** to run CP/M applications, its 64K of RAM is still there for your PC.

And the Function Key enables you to move mountains.

Our KEYFIX utility expands the power of your extended IBM PC keyboard. Single keystrokes can move tons of text, or provide standard answers to often asked questions. Our **Baby Blue** also comes bundled with ***Micropro's WordStar/MailMerge***, ideally configured for the IBM PC keyboard, or with ***InfoStar***, for high-speed, easy to use data base management.



Baby Blue **$600**
Baby Blue with WordStar/MailMerge **$995**
Baby Blue with InfoStar **$895**

As far as the rest of the "Guess Who's Blues" go, we'll keep you guessing; but for more details see your microcomputer dealer or contact Microlog at:

Microlog
A TU INTERNATIONAL COMPANY

(914) 368-0353 MICROLOG, INC., 222 Rte. 59, Suffern, NY 10901

Reader Service #236

The Fifth Generation

Mark Seligman

In recent years Japan has gained impressive market shares in several areas of trade, including steel, consumer electronics, and automobiles. It's about to happen again in the computer industry, say Edward Feigenbaum and Pamela McCorduck in their book, The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge to the World. *The authors claim that the latest Japanese challenge to United States supremacy must be met or "we may consign our nation to the role of the first great post-industrial agrarian society."*

The Japanese national 10-year plan to take control of the computer industry began rolling in April 1982 with the aim of engineering the fifth computer generation. At issue is a potential revolution embodied in a new generation of computers that will transform the way we work.

The fifth generation already! For those not at all sure what the first four were, here's a rapid review. Digital computers need switches. In "on" position, the switches signify the number 1 or the logical value "true"; in "off" position, they stand for 0 or "false." When artfully arranged and interconnected, the switches make the computer compute. In the beginning vacuum tubes were used as switches. They were large, slow, and energy greedy. Second came the much smaller, faster, and more efficient transistors used as individual switches. In the third stage, hundreds or thousands of transistors—switches—were manufactured together in preplanned configurations as integrated circuits. In the fourth, comparable arrangements became microscopic in very-large-scale integrated circuits (VLSI).

The fifth generation will certainly bring continued shrinkage of switching elements. More important, in the Japanese view, will be the qualitative changes made practical by advances in computer hardware: generation five is to bring us supercomputers that run expert system software. The new systems will be conceptually as well as functionally different from the previous generations of computers. As the authors explain, the fifth generation "signals the shift from mere data processing, which is the way present-day computers function, to an *intelligent* processing of knowledge." Fifth-generation systems will be expressly designed to run artificially intelligent programs capable of performing tasks at a level comparable with human experts.

In introducing the reader to expert systems, Feigenbaum, a computer science professor at Stanford University, is playing a song he knows well. In 1965 he produced one of the first expert systems with colleagues

Generation five is to bring us supercomputers that run expert system software.

Joshua Lederberg and Carl Djerassi. *Dendral* is an expert system programmed to infer molecular structure when given data available to physical chemists. The program now makes the inferences more reliably than the chemists do and indeed more reliably than its designers.

In Feigenbaum's view, the *Dendral* program marked several significant changes in artificial intelligence research. After *Dendral*, expert system programs increasingly turned away from the ivory chessboard toward real-world problems. At the same time, consensus grew that for solving real-world problems expert systems



required more than abstract problem-solving techniques. Large quantities of real-world knowledge were also needed to develop expert systems.

Medically oriented expert systems contain the most prevalent type of real-world knowledge base. Medical diagnostic aids must be able to reason with method and efficiency; if the system doesn't know which symptoms indicate which diseases, it will reason about nothing, and no amount of cogitation will produce reliable diagnoses. The *Internist/Caduces* expert system at the University of Pittsburgh was designed as a diagnostic aid in internal medicine. Its knowledge base covers more than 500 diseases and 3500 symptoms of disease. To identify the specific illness of a patient, the physician provides the computer with lab test results and patient history, and the program begins to reason about possible diagnoses.

The computer acts as a consultant, asking the physician questions, suggesting tests when crucial information is missing, or explaining its line of reasoning. Diagnoses are accompanied by confidence ratings such as, "There is a 65 percent probability that the patient has bubonic plague," or explanations such as, "Spots before the eyes, ringing in the ears, and halitosis seen in combination could indicate either Tasmanian flu or bubonic plague; however, fuzzy tongue and itching behind the knees would eliminate Tasmanian flu."

Super Logicians

If expert systems already existed as far back as 1965, what are Feigenbaum and McCorduck talking about now? What are the Japanese doing that is so new or threatening? The Japanese are aggressively developing supercomputers optimized to run expert systems, and they are planning mass distribution of expert system use. The authors stress that whoever establishes superiority in knowledge technology will control the balance of world power, regulating both the cost and the availability of knowledge.

The fifth-generation computers envisioned by the Japanese will deal in symbols more than numbers, and with logical operations more than arithmetic ones. Appropriately, their logic processors will be the machine language PROLOG, a logic-oriented programming language developed in Europe. But again, these are to be supercomputers; they will be more powerful and much faster than their predecessors.

The speed of fifth-generation computers will be measured in logical operations per second. The Japanese are aiming for between 100 million and 1 billion operations per second (current speeds are measured in millions of arithmetic operations in the same span). However, the real power of these computers will be in their capacity to reason and expand the boundaries of human intelligence.

Expert Systems

Daniel Farber

Although the knowledge processing industry is still in its infancy, the authors of *The Fifth Generation* point out that expert systems and the knowledge processing technology required to build them had developed a basic framework by the late 1970s (see Figure 1). The main ingredient of an expert system is knowledge—data that has been selected and transformed into the substance of so-called intelligent machines. Feigenbaum and McCorduck explain that two types of knowledge are involved in forming a knowledge base: factual and heuristic.

Factual knowledge includes facts and opinions commonly accepted among experts in a given field such as law, medicine, or geology. Heuristic knowledge, on the other hand, is a more intuitive, trial-and-error type of knowledge that an expert gains through years of experience—knowledge that can't be garnered from the factual data of a textbook. Both types of knowledge are essential to forming an efficient knowledge base.

An expert system also requires a problem-solving strategy, or inference system designed to comprehend and manipulate the knowledge base and the specific problem data input into the system. An inference system provides a method by which lines of reasoning can be constructed using common, step-by-step logical structures such as syllogisms. Since real-world knowledge involves a great deal of imprecise knowledge, some inference systems have uncertainty factors built into them.

Of central importance in the design of an expert system are the way the knowledge base is represented as data structures in the computer and the

Since vast amounts of knowledge will be on file on the new computers, large memory banks must be available to accommodate it. Ultimately, the system should contain 1000 characters worth of knowledge on each of 100 million things—as much knowledge, by one estimate, as is contained in the *Encyclopaedia Britannica*. Tens of thousands of logical rules will be needed to sort through all that lore (e.g., if animal *X* has warm blood, has hair, and bears live young, then animal *X* is a mammal). Parallel processing will replace the one-step-at-a-time procedures of the standard von Neumann architecture of today's computers; jobs will be divvied up so that many subjobs can be in the works simultaneously.

way that knowledge base is accessed for problem solving. These tasks are performed by the knowledge engineers and programmers who design the programs that make up an expert system. Knowledge engineers elicit the knowledge from the minds of human experts, shape the knowledge so that programmers can transform it into viable program codes (knowledge bases), and create the inference systems that use a knowledge base to derive specific results.

Feigenbaum and McCorduck relate that acquiring knowledge from human experts poses a major problem in artificial intelligence research. An expert system is only as good as the knowledge represented in the computer. Currently, knowledge engineers must painstakingly extract heuristic knowledge from human experts through a series of interviews. The process of simulating an expert's thought process and erudition is costly and time consuming. Knowledge, like the human mind, is not easily defined; an expert may not be able to articulate clearly or formulate his or her knowledge in a hypothetical situation.

Knowledge engineers usually present a hypothetical problem to an expert as a way of focusing the knowledge acquisition process, but the situation may not bring out all contingencies. Expert systems in operation today are restricted to narrowly defined areas of expertise to maintain a high degree of problem-solving proficiency. Natural language communication between computers and humans must also be improved to allow for more in-depth exchange between programs and users.

Illustration from *The Fifth Generation* by Edward A. Feigenbaum and Pamela McCorduck reprinted with permission from Addison-Wesley Publishing Co.

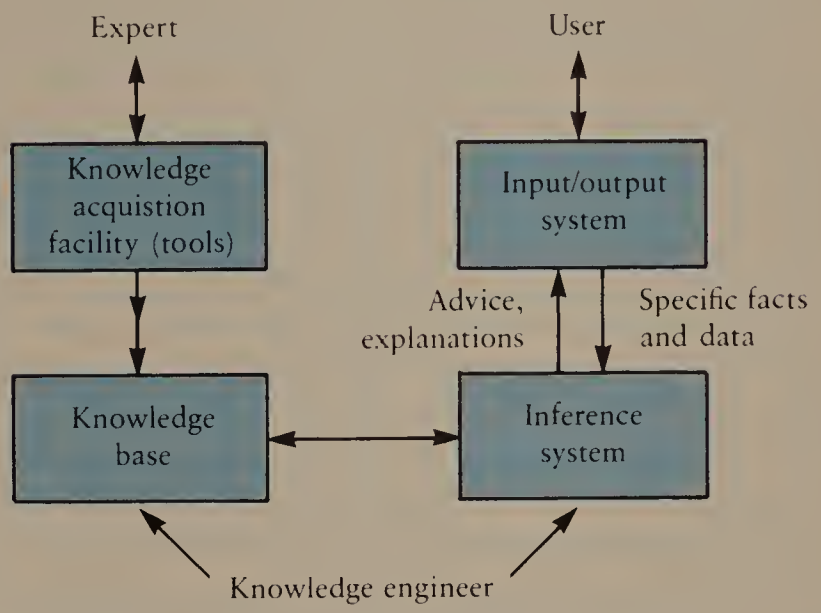


Figure 1: Basic structure of an expert system

Teaching computers to learn—to acquire knowledge independently—is another obstacle. Factors in the human thought process such as emotion, will, and the ability to use errors creatively are as yet beyond the capabilities of an expert system. A computer cannot be said to replicate an expert's knowledge exactly until these design problems are solved. Knowledge acquisitions research is exploring these critical issues in the hope of developing more comprehensive, automatic methods of creating expert systems.

Producing knowledge machines that few people can use will not revolutionize the world economy. The Japanese expect that use will be tremendously expanded if people can communicate with the systems in natural languages such as Japanese, English, or Swahili. Accordingly, researchers will put a major research effort into natural language processing.

The subject of natural language processing brings us to the folks at home. You'll be calling on expert systems whenever you need expert advice. According to Feigenbaum, personal computers powerful enough to support today's modest expert systems (about half a megabyte of memory) are already on the market—even without the Japanese. Home-oriented software should follow in 2 or 3 years.

Are your plants unaccountably turning yellow? Have you found that even your broker can't keep up with the latest money market options? Are you afraid of doctors and lawyers or too poor to call them in when you need them? Expert systems will be on call day or night, providing instant, specific solutions to your problems.

The Japanese, of course, have concerns beyond diagnosing plant diseases. Resource-poor, they must continually raise productivity to compete. They see working smart as the key, and expect intelligent computing to affect every area of their economy—and the world's.

An AI Potpourri

More than a report narrowly focused on Japanese enterprise, *The Fifth Generation* is a collection of short essays on the international climate in computational research on artificial intelligence in general, and expert systems in particular. No doubt the essay approach facilitated shared authorship, and it provides bite-sized chunks for easy reading. The format, however, allows a good deal of repetition to creep in and gives the feel of a work made up of pieces that still need to be assembled.

Still, many of the pieces are worth the price of admission. I approached *The Fifth Generation* hoping to find out what Japanese computer technologists are up to. I found out. I got a clear view of the nascent Institute for New Generation Computer Technology (ICOT), its driven director Kazuhiro Fuchi, and the 40 samurai charged with producing a miracle. I learned how the project was organized in the face of Japanese conservatism, how research is being flexibly structured, and how results are to be continually disseminated.

As for expert systems per se, while purposely avoiding details, the book provides a comprehensible introduction to the concepts involved. There is an informative account of the range of expert system applications, such as furnishing drilling advice on remote oil rigs, troubleshooting the design of integrated-circuit chips, helping to customize computer systems, analyzing DNA sequences, and heading off power-grid blackouts.

> The real issue is whether humans can maintain a sense of worth as machines increasingly take over intellectual tasks.

How does the know-how get into the software? The authors describe how knowledge engineer H. Penny Nii elicits knowledge from human experts for incorporation into expert systems. To their credit, Feigenbaum and McCorduck are aware of the human side of this interchange; they describe the excitement and the awe of the expert who sees his or her knowledge transmitted piecemeal to a machine. On the other hand, they tell of the pain of the expert who comes to realize that hard won expertise can be reduced to a few hundred rules. "At first he was disbelieving," say the authors. "Then he was depressed. Eventually he departed his field, a chastened and moving figure in his bereavement."

Emotional and philosophical questions are unavoidable in an essentially popular work on "machines who think" (as McCorduck calls them). With some distaste, McCorduck takes on the overworked question of whether machines really can think. The real issue, she feels, is whether humans can maintain a sense of worth as machines increasingly take over intellectual tasks that only humans have done up to now. She quotes Edward Fredkin of MIT on this point: "Humans are okay. I'm glad to be one. I like them in general, but they're only human. It's nothing to complain about. Humans aren't the best ditchdiggers in the world—machines are. There were people whose thing in life was completely physical—John Henry and the steam hammer. Now we're up against the intellectual steam hammer. The intellectual doesn't like the idea of this machine doing it better than he does, but it's no different from the guy who was surpassed physically." McCorduck notes in the conclusion that the arguments adduced these days to prove computers incapable of thought are similar to those brought out a century ago against the intellects of women. Good point.

Whether or not computers can think, McCorduck, a New York-based science writer, apparently can. An engagingly grumpy presence throughout the book, she presents herself as a seasoned cookie who knew artificial intelligence in knee britches. Expressing a personal stake in the Japanese proposal to produce robot geriatric nurses, she made me smile.

Feigenbaum and McCorduck sometimes disagree, most explicitly on the social consequences of increasing the use of expert systems. Both are concerned about the economic and intellectual alienation of the computer illiterate. On balance, however, Feigenbaum expects people to see the way the wind blows and turn computation to their advantage, particularly as costs decrease. McCorduck is skeptical. The importance of print literacy has been recognized for centuries, she observes, and free books abound in public libraries—but illiteracy persists.

Misgivings

During a recent discussion with Feigenbaum, I asked him whether he anticipated legal problems when computers begin giving advice in earnest. "No," he said, there will always be "a human in the loop" taking full responsibility. Expert systems are designed to aid decision makers, not replace them, he insisted. But aren't expert systems sometimes intended to stand in for absent experts, reason more quickly than humans in the face of impending blackouts and meltdowns, or gather together expertise that no one person commands? We'll see.

Is the book's Paul Revere tone justified? Can the Japanese really turn the trick of producing a breakthrough? Feigenbaum and McCorduck examine the criticisms leveled at the fifth-generation project by the American artificial intelligence community—overemphasis on logic at the expense of alternative processing methods, and overemphasis on speed and memory capacity at the expense of software in general. Feigenbaum adds his own observation that where expert systems are concerned the Japanese are still wet behind the ears.

The conclusion, however, is that the fifth-generation project will have dramatic results even if the goals are only partly achieved. The Japanese have the equivalent of a well-supported and beautifully organized space program; they may not reach the moon in years, but in trying they stand to learn enough to undercut us in the knowledge processing industry, as they already have in other markets.

> The real power of these computers will be in their capacity to reason.

Feigenbaum emphasizes that his concern is not xenophobic but economic. (As a scientist, he says he could take a purely internationalist viewpoint.) In my view, his economic concerns are justified but may not go far enough. Even if we keep our share of high-tech markets, there's ample reason to fear that as automation gallops ahead (spurred on even faster by developments in artificial intelligence and robotics) unemployment will remain a serious problem. It will be small comfort to the American unemployed if the elite who do have jobs are American as well as Japanese. The problem isn't simply the international distribution of jobs—it's the distribution of jobs, period. Feigenbaum and McCorduck hope that knowledge-related employment will take up the slack left by the automation of manufacturing and paper shuffling. I hope so too.

A Call to Arms

What's going on outside Japan? *The Fifth Generation* devotes considerable space to the infighting and stodginess that robbed England of an early lead in the field of artificial intelligence. Research carried out by other Europeans is treated rather sketchily, and the Soviet Union is fairly written off as hogtied by ideology.

Is the United States responding effectively to the Japanese challenge? No, say the authors. The Microelectronics and Computer Technology Corporation (MCC), a research consortium with participation by such firms as DEC, Control Data, and Honeywell, is probing the issues, but antitrust laws limit the extent of the cooperative research allowed and effectively prohibit the participation of giants like IBM, Hewlett-Packard, and Texas Instruments.

Now under consideration in Congress are research proposals from the Department of Defense and the Senate Committee on Labor and Resources (the latter initiated by Edward Kennedy), but these proposals are many votes away from passage. In the past we've seen the GI Bill, The National Defense Student Loan program, and the science buildup after Sputnik. But this time around money is tight.

Feigenbaum and McCorduck advocate the formation of a national knowledge technology lab, operating independently under federal charter. But at the moment no such institution is in view.

"If we continue as we have, [Japan and the United States] will act as guinea pigs for an interesting experiment in planned, as opposed to unplanned, research. At the moment, we Americans are placing our economic and defense bets on a method that has more or less worked for us in the past (though our current economic situation throws some doubt on its utility in a complex post-industrial world). That method, of course, is wholly decentralized planning, cutthroat competition, and a touching faith that the best will win because economic laws work that way."

"We don't like planning," said Feigenbaum at a recent press conference. "It smacks of telling us what to do." The message of *The Fifth Generation*—a timely one as the 1984 elections approach—is that if we Americans refuse to plan while others plan skillfully, we may like the results of not planning even less than we like planning.

Mark Seligman is a graduate student in linguistics at the University of California at Berkeley. He is especially interested in artificial intelligence research.

The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge to the World
Edward A. Feigenbaum and Pamela McCorduck
Addison-Wesley Publishing Co., Reading, Massachusetts, 1983
288 pages; $15.55



You Wouldn't Go to Work Without Your Pants

Why Buy an IBM-PC Without FAST FACTS

Your IBM-PC is only half-ready for work if it doesn't have FAST FACTS, the executive's filing system. FAST FACTS, you see, makes full use of the IBM-PC's capability to handle information quickly and efficiently. No matter if you're a business executive or home executive, FAST FACTS can take care of your filing needs. And with its built-in *Report Writer*, FAST FACTS, makes it a snap to summarize selected portions of your files. What's more, FAST FACTS can share information with VISICALC®, 1-2-3™ and WordStar®. It's also priced to fit easily in your computer budget.

So don't purchase an IBM-PC that's only half-ready for work. Get FAST FACTS, the latest introduction of Innovative Software, developers of proven executive businessware for the IBM-PC. (Ask your dealer about T.I.M. III and FAST GRAPHS, two other fine products from Innovative Software.)

Innovative Software® developers of practical businessware for the executive.

9300 W. 110th St., Suite 380
Overland Park, KS 66210 USA
913/383-1089 • Telex: 209542

Innovative Software's products are available at Computerlands®, Sears Business Centers, The Xerox Stores, Computer Marts, Entre' Computer Centers℠, CompuShops® and other quality dealers.

Reader Service #225

You've got problems. Get an expert to help you. Get KnowledgeMan.

Why not dBASE II or 1-2-3? Because KnowledgeMan gives you the best of the data management and spreadsheet worlds...and much more—integrated to manage information like no other package can.

Designed to be **more powerful** and **easier to use**, KnowledgeMan has it all. Fast, efficient storage. Queries like IBM's SQL DS. 3rd generation spreadsheet. Report writer. I O screen manager. Statistics. Structured programming language. Security.

Introducing KNOWLEDGEMAN
The all-in-one software package that "Out-Thinks" the competition

KnowledgeMan Is:

- **Easy to get to know.** Goes to work fast with easy-to-follow documentation.
- **Friendly and intelligent.** Interactive. English-like commands. Answers spur-of-the-moment questions.
- **Organized.** Keeps track of data in concise tabular form.
- **Efficient.** Supports B^+ tree indexing and virtual fields.
- **Neat.** Produces forms the way you want, on the screen or on the printer. Automatic editing and integrity checking.
- **Great with figures.** Statistics, including means and standard deviations. Square roots, logarithms, trig functions, random numbers, etc.



DO YOU NEED TO...	dBASE II	1-2-3	KnowledgeMan
Store and retrieve data?			
■ Max fields per record	32	256	255
■ Max tables open at once	2	1	Unlimited
■ Max records per table	65,535	2,048	65,535
■ Query multiple tables with a single command	No	No	Yes
■ Dynamic sort of query output	No	No	Yes
■ Multi-level control breaks	No	No	Yes
Use a spreadsheet?			
■ Rows by columns	0 x 0	2048 x 256	255 x 255
■ Cell can extract data from independent tables	No	No	Yes
■ Cell can be entire program	No	No	Yes
Make screens, forms attractive?			
■ Color, reverse video, blinking, half-intensity, bell.	No	No	Yes
■ Form-at-a-time processing	No	No	Yes
Safeguard data?			
■ Passwords, data encryption	No	No	Yes
■ Field level read/write protection	No	No	Yes

The information in this table is believed to be correct based upon vendor documentation but cannot be guaranteed.

ORDER KnowledgeMan now—only $500, *the best value on the market.* First releases are for the IBM PC, Victor/Sirius, Altos. Call regarding other environments.

Handling & shipping: add $10 for U.S., Canada, Mexico; $45 elsewhere. Indiana residents add 5% sales tax. VISA and MASTERCARD orders may be placed by phone.

Call (317) 463-2581 or see your local computer dealer for a demo.

Micro Data Base Systems, Inc.

KnowledgeMan is a Trademark of Micro Data Base Systems, Inc. SQL/DS, PC of IBM, Victor/Sirius of Victor Business Systems. Altos of Altos Computer Systems, dBASE II of Ashton-Tate. 1-2-3 of Lotus Development Corp.

Send check or money order payable to.
Micro Data Base Systems, Inc., P.O. Box 248
Lafayette, IN 47902, Attn: David Bartkus

Name_____

Address_____

City_____ State_____ Zip_____

Phone ( )_____

Operating System ☐ PCDOS ☐ MSDOS ☐ CP/M-86

Machine / disk format _____

☐5¼" IBM PC SS ☐5¼" Victor/Sirius ☐8" IBM 3740 SS-SD
172K RAM & 500K mass storage recommended

☐ Check or money order enclosed (U.S. Currency)

☐ MasterCard/VISA No._____

Expiration Date_____ Bank No. (if MC)_____

Signature_____

☐ Please send more information A08K2

Reader Service #233

PCnet and the IBM-XT

Your Total Solution for IBM PC Local Area Networks.



IBM-PC IBM-PC IBM-XT IBM-PC

Share Your IBM-XT Hard Disk or other Hard Disk (*)

PCnet Major Features

- **Local Area Network and Shared Resource Management**
  - Broadcast Coaxial Bus Network
  - Up to 16 PC's per shared PC Server
  - Up to 8 PC Servers
  - Network errors handled similar to DOS
  - PC to PC communications
- **Computer Vendor Independence**
  - IBM PC, IBM PC-XT
  - Compaq
  - Colby
  - Columbia
  - Corona
- ***Hard Disk Vendor Independence**
  - IBM
  - Santa Clara Systems
  - Tallgrass
  - Tecmar
  - Microcode
  - QCS
  - Datamac
  - Davong
  - Corvus
- **Remote PC Execution**
  - Background program execution at Shared PC
  - Multi-tasking use of Printers, Modems, etc. . .
- **IBM MS-DOS Transparency**
  - MS-DOS 1.1,2.0
  - Off the Shelf program execution over network
  - File Transfers use MS-DOS commands
- **Disk and File Sharing**
  - Public and Private Files/Volumes and Disk
  - File/Record Locking and Unlocking
  - No Dedicated File Server; PC can act as File Server
  - Multiple File Servers
- **Performance**
  - Serial coaxial bus at 1 megabit up to 7000 feet
  - No significant User PC degradation

Future Features

- Networking
  - SNA, ETHERNET,X.25
- Other Computer
  - TI, Victor, Eagles
- Value Added Applications
  - DBMS

- **Ease Of Use**
  - Single PC slot for PCnet adapter card
  - Standard coax and BNC connectors
  - Automatic Load using AUTOEXEC.BAT

Reader Service #133

ORCHID TECHNOLOGY
487 Sinclair Frontage Road,
Milpitas, California 95035 • (408) 942-8660
Telex-171596

IBM is a registered trademark of International Business Machines Corp.
MS DOS is a registered trademark of Microsoft Corp.
PCnet is a trademark of Orchid Technology.

Copyright 1982 Orchid Technology

Specifications subject to change without prior notice.



When ordering, please specify both the computer/operating system and the hard disk/version. Orchid supports many different combinations and is adding new configuarations each day.

FOR WINNERS ONLY



PROFESSIONAL FOOTBALL ANALYSIS SYSTEM

THE MOST COMPREHENSIVE SYSTEM — NOW AVAILABLE FOR 1983

At the controls of the most sophisticated football analysis software, your personal computer can make the upcoming football season the most exciting ever!

GRIDSTAR™, the professional football analysis system, is comprised of four main components:

★ PROFESSIONAL FOOTBALL DATA BASE — File comprised of 2184 regular season games, 1973 to 1983 inclusive.

★ DATA BASE MANAGER — Comprehensive utility to display, edit, and search your Data Base.

★ WEEKLY HANDICAPPER — This program handicaps a full week of games using the GRIDSTAR™ STRATEGY.

★ GRIDSTAR™ DEVELOPMENT PROGRAMS — All programs used to develop and test the GRIDSTAR™ STRATEGY.

Professional Football Data Base
At your disposal, a complete history of America's No. 1 Sport — 11 years of game data. Each 16-byte game record includes home and away teams, home and away scores, the closing line, day, week and date.

Data Base Manager
To keep your Data Base current for years to come, full EDIT FUNCTION allows you to change or add any game record. The sophisticated DISPLAY MODE lets you scroll up and down through your Data Base. The extensive SEARCH FUNCTION is a serious analytical tool. Set any combination of 20 search parameters and invoke a search for qualified games. Automatic won/loss analysis can be instantly displayed.

Weekly Handicapper Using the GRIDSTAR™ STRATEGY
This is your Sunday morning predictor program. The program applies the GRIDSTAR™ STRATEGY to each upcoming game and tells you which teams to bet. It will indicate 5 to 10 bets each week determined by the five analysis angles of the GRIDSTAR™ STRATEGY. Your only responsibility is to keep the Data Base current, by keying in the lines and scores each

The GRIDSTAR™ STRATEGY
Employing advanced statistical techniques, our development team has researched numerous methods of predicting winners against the spread. Of these, five approaches proved effective enough to be incorporated into the GRIDSTAR™ STRATEGY.

- POWER RATING ANALYSIS
- STREAK ANALYSIS
- POINTSPREAD ANALYSIS
- HEAD-TO-HEAD ANALYSIS
- MONDAY NIGHT ANALYSIS

Each of the above approaches, taken separately, has proven to be a consistent winner. But when combined into a comprehensive handicapping system, the GRIDSTAR™ STRATEGY, the results have been consistently spectacular, year after year. The following table presents the GRIDSTAR™ STRATEGY's record versus the spread over the last decade.

THE GRIDSTAR™ STRATEGY 10-YEAR PERFORMANCE VS. THE SPREAD

	Games	Win	Loss	Tie	Pct
1973	116	76	40	0	655
1974	107	69	37	1	650
1975	103	63	36	4	631
1976	126	71	51	4	580
1977	130	77	43	10	631
1978	128	75	46	7	613
1979	149	94	51	4	644
1980	131	90	37	4	702
1981	148	93	52	3	639
1982	57	34	23	0	596
TOTAL	1195	742	416	37	636

Performance Absolutely Verifiable
All the programs used to develop the GRIDSTAR™ STRATEGY are included in the package. You can run these programs, verify the results, and trace the entire developmental process. The seven strategy development programs not only provide proof of performance, but can form the basis for further research.

Complete Documentation
The accompanying OPERATIONS MANUAL is extensive. Over 100 pages of text take you through the Data Base layout, operation of each program, and the fine points of computer sports analysis. Over 30 charts and illustrations highlight the presentation.

System Requirements
TRS-80* MOD. I or MOD. III, 48k, 1 Drive
IBM PC**, 64k, 1 Drive

Every program in the GRIDSTAR™ package is in BASIC, structured, modular, and fully commented. Easy to use, each program is user-friendly, menu-driven, with air tight error-trapping.

Complete Package $195.00

* Registered Trademark of Tandy Corporation
** Registered Trademark of IBM Corporation

GRIDSOFT
7777 Keele Street, Unit 8
Concord, Ontario, Canada
L4K 1Y7

ORDER BY MAIL or PHONE: (416) 738—1700

GridSoft Inc., 7777 Keele Street, Unit 8, Concord, Ontario, Canada L4K 1Y7
Yes! Rush me the complete **GRIDSTAR™** package at a cost of $195.00.
Please check program required: ☐ **IBM PC**** ☐ **TRS-80 MOD. I*** ☐ **TRS-80 MOD. III***
Dealer Inquiries Invited

Name _____

Address _____

City _____ State _____ Zip _____

Card Number _____ Expiry Date _____

Signature _____ ☐ Check ☐ Money Order ☐ Visa ☐ MasterCard

Programming

dBASE II™ $398

The most widely sold DMBS for micros, dBASE II defines the state of the art. An inexperienced user can create a dBASE file, begin data entry, and print out a report in minutes; the experienced programmer can create complex program systems using dBASE's unique programming language. Both can use automatic program generators and other programming tools to create applications quickly and easily.

THE DATABASE ACCELERATOR: Automatically creates menus and "intelligent" data entry screens which check input for correctness. Eliminates 80—100% of dBASE programming time! **$195**

QUICKCODE: Fox & Geller's popular generator. **$185**

dGRAPH: Allows you to see your dBASE file in graphic form—a real aid to understanding. **$195**

ABSTAT: Allows you to analyze your data using a wide variety of statistical tests. Can be used with dBASE files or by itself. Also does bar graphs and plots. **$359**

EDIX & WORDIX . . $279

EDIX is a full-screen editor specifically designed to take advantage of the advanced features of the IBM PC; WORDIX is the best text formatter on the market. Together, they are an unbeatable combination, the finest word processor available on a micro—at an unbeatable price!

EDIX alone **$149**

WORDIX **$149**

MULTIPLAN™ $189

The world's hottest-selling spreadsheet, Multiplan™ is now setting the standard for ease of use and quality of documentation. Each of the Multiplan™ series comes complete with sophisticated training programs.

Multi-Tool Budget 'expert system': used with Multiplan, enables new users to get budgets out in minutes **$69**

Multi-Tool Financial Statement: Expert help in getting out financials. **$109**

SMARTMODEM

300 $209

1200 $509

1200B $479

These Hayes Stack Modems link your computer's RS232 serial port directly to a modular phone jack. They will dial the phone for you, and answer it as well. The Smartmodem 300 runs at 0—300 baud; for those needing higher speed, the Smartmodem 1200 can run at 1200 baud.

NEW! NEW! NEW! **Smartmodem 1200B:** for the IBM PC only **$469**

(800) 222-8811

International

IBM PC SOFTWARE (PC/MS DOS)

Business

	LIST	SALE
American Training International		
Power for PC DOS	75	56
Aptek		
Rainbow Writer		125
Ashton-Tate		
Financial Planner	700	489
Aspen Software		
Grammatik	75	56
Proofreader 32K	50	38
Proofreader 50K	50	38
Proofreader 80K	50	38
BPI Systems Inc.		
Personal Accountant	195	160
Beaman Porter		
Powertext	399	369
Best Products		
Personal Financial Pgm	95	66
Comprehensive Software Support		
PC Tutor	80	60
Comshare		
Financial Modeling	325	264
Continental Software		
FCM (First Class Mail)	125	79
Home Accountant Plus	150	99
Datamost		
Real Estate Inves. Prg.	130	95
Eagle Software Publishing		
Money Decisions Vol. 1	199	129
Money Decisions Vol. 2	230	169
Money Pack Vol. 1 & 2	400	299
Emerging Technology		
Edix	195	149
Edix + Wordix	390	279
Howard Software		
Real Estate Analyzer	250	185
Information Unlimited Software		
AP	595	389
AR	595	389
Easy Planner	250	188
Easy Speller 1.1 (Dead)		
Easy Speller 2	225	135
Easy Speller 2/Legal	350	229
Easy Speller 2/Medical	350	229
Easy Writer II	350	229
Financial Mgmt. (AR/AP/GL)	1495	1019
GL	595	389
INV	595	389
Order Entry	595	389
Payroll	595	389
Intellect Associates		
PC Text	100	73
Window	150	113
Lexisoft		
Spellbinder	495	259
Lifetree		
Volkswriter	195	129
Metasoft		
Benchmark Mail List	250	184
Benchmark Word Processor	500	367
Micro Pro		
Mailmerge	250	165
Spellstar	250	165
Word/Mail	695	426
Word/Spell	695	426
Word/Spell/Mail	845	558
Wordstar	495	327
Microsoft ®		
Multiplan™	275	189
Oasis		
Punctuation & Style	0	109
The Word Plus	150	112
PBL Corporation		
Personal Investor	145	98
SERIES 4 PAK (GL,AR,AP)	595	349
Pro-Tem		
Notebook	150	
Scripps Data Systems Inc.		
Job Cost System	495	371
Select Information Systems		
Select Word Processor	595	339
Softward		
Wordmate	500	340
Software Arts		
TK!Solver		224
Software Products International		
Logicalc	190	142
Procalc	350	262
Sorcim		
Supercalc	195	129
Supercalc 2	295	185
Superspellguard	195	129
Superwriter	295	179
Supersoft		
Dptimizer	200	149
Texasoft		
Thinker (Spreadsheet)	75	56
Versatext	200	172
Visicorp		
8usiness Forecasting Modl	100	78
Desktop Plan	300	229
Visicalc	250	169
Visispell	225	183
Visiwork	375	298

Database

	LIST	SALE
Alpha Software		
Database Manager	245	169
Mail List	95	67
Applied Software Technology		
D8ASE	189	143
Versaform	389	259
Ashton-Tate		
d8ASE II	700	398
dBASE II w/user's guide	729	429
Conceptual Instruments		
Desk Organizer		245
Condor Computer Corporation		
Condor 1	295	189
Condor 3	650	398
Fox & Geller		
Duickcode	295	185
dGRAPH	295	195
dUTIL	99	59
Information Unlimited Software		
Easy Filer	400	279
Innovative Software		
TIM III	495	279
Link Systems		
Data Fax	299	224
Micro Pro		
Infostar	495	327
Reportstar	350	231
North American Business Systems		
< < Answer > >	250	159
PC Software		
Creatabase	75	67
Software Products International		
Logiquest II	250	188
Logiquest III	550	412
Software Publishers		
PFS: File	140	105
PFS: Report	125	94
Supersoft		
Personal Data Base	125	93
Synapse Video		
File Manager	150	112
Synergistic Software		
Data Reporter	250	169
Visicorp		
Visidex	250	189
Visifile	300	219

Hardware

	LIST	SALE
Hayes Microcomputer Products		
Smartmodem 12008	599	479
Microsoft ®		
Mouse™	195	149

Home/Education/Games

	LIST	SALE
Acorn Software		
Lost Colony	30	22
Lost Colony	30	22
Aptek		
PC Ticker Tape		22
Automated Simulations/Epyx		
Curse of Ra	20	15
Temple of Apshai	40	30
Upper Reaches of Apshai	20	15
Avalon Hill		
Andromeda Conquest Computer	23	17
Stocks & Bonds	25	19
Draw Poker	21	16
Galaxy	25	19
Midway Campaign	21	16
Voyager	25	19
Bible Research		
THE WORD Processor		146
Blue Chip		
Millionaire	100	75
Broderbund Software		
Apple Panic	30	22
Datamost		
Pig Pen	30	22
Space Strike	30	22
Friendly Software		
Friendlyware	50	38
Infocom		
Deadline	50	37
Starcross	40	30
Suspended	50	38
Zork I	40	30
Zork II	40	30
Zork III	40	30
Information Solutions, Inc.		
25:01 The 25th Hour	100	74
ISM		
Mathemagic	90	65
Lightning		
Master Type	50	38
Microsoft ®		
Flight Simulator™	50	38
Omric		
8lingsplats	35	26
Championship Draughts	35	26
Space Guardian	30	22
Sierra On Line		
Crossfire	30	22
Frogger	35	26
Ulysses & Golden Fleece	40	29
Sirius		
Conquest (Call To Arms)	30	22
Strategic Simulations		
Warp Factor	40	30

Language

	LIST	SALE
Howard Sams		
Programmer	200	150
Liteboat		
C-Food Smorgasborg		
Lattice C Compiler	500	415
Microsoft ®		
C Compiler™	500	400
Mumath/Musimp™	300	225
Pascal™	500	400
muLisp/MuStar™	250	188
Ryan-McFarland		
RM/Cobol		
Full Dev System	950	713
RM/Cobol Runtime Only	250	188

Utility/Comm/Graphics

	LIST	SALE
Alpha Software		
Apple-I8M Connection	195	135
Typefaces	125	87
Aptek		
Epson to Prism		38
Byrom Software		
8STAM	200	149
8STMS	200	149
Cavalier		
Championship Blackjack	40	30
Central Point		
Copy II PC	40	35
Hayes		
Smartcom 2	119	90
Hercules		
Graphics CARD	499	399
Innovative Software		
Fast Graphs	295	159
Insoft		
Data Design	225	169
ISM		
Graphmagic	90	65
Graphmagic Combo	150	119
Microstuf		
Crosstalk/Smartmodem	195	135
Peter Norton		
Utilities	80	60
Southeastern		
Data Capture	120	90
Versa Computing		
Graphics Hardcopy	25	19
Versawriter Graphics Tabl	299	249
Visicorp		
Visitrend/Plot	300	215
Wooll		
Move It	150	99

IBM PC HARDWARE

Hardware

	LIST	SALE
AST Research		
Combo + 64K	595	429
MEGA + 64K	595	429
Corona		
10 M8 Hard Disk	2295	
5M8 Hard Disk	1795	
Corvus		
PC Interface, Cable, Man.	300	239
Kraft		
Joystick	70	52
Microsoft ®		
128K RAM™	525	379
192K RAM Card™	700	499
256 RAM Card™	875	624
64K RAM™	350	249
64K RAM Chip Set™	175	139
Programming International		
PC-Hayes Cable	35	29
QCS		
8ig Blue	595	449
Quadrum		
256K DUAD8DARD	595	435
64K Quadboard	395	289
64K RAM Chip Set	95	75
Asynch Adaptor, RS232	110	90
Quadcolor I	295	220
Symtec		
Light Pen	150	126
TG Products		
Joystick	65	49
Trackball	65	49
Tandon		
TM100-2 Drive (5¼" DS)	650	249

™ = Manufacturer's trademark

PC SOFTWARE — CP/M-86

Business

	LIST	SALE
Comshare		
Financial Modeling	325	264
Dictronics		
Random House Thesaurus	150	113
Metasoft		
Benchmark Mail List	250	184
8enchmark Word Processor	500	367
Structured Systems		
AP	1250	790
AR	1250	790
GL	1250	790
INV	1250	790
Order Entry	1250	790
PR	1250	790

Database

	LIST	SALE
Ashton-Tate		
dBASE II	700	398
Fox & Geller		
Duickcode	295	195
dGRAPH	295	195
dUTIL	99	59
Organic		
Datebook	395	331

Language

	LIST	SALE
Digital Research		
C886 (avail soon!)		
C8ASIC 86	200	150
CIS CD8DL 86	800	600
CP/M-86	60	45
Concurrent CP/M-86	350	264
Level 2 CD8OL 86	1600	1200
Pascal MT+ 86	400	300
Pascal MT+86 With SPP-86	600	450
SID 86	150	94
Micro Focus		
CIS Cobol 8086	850	637
Ryan-McFarland		
RM/Cobol		
Full Dev System	950	713
RM/Cobol Runtime Only	250	188

Utility/Comm/Graphics

	LIST	SALE
Byrom		
8STAM	200	149
Wooll		
Move It	150	99

HARDWARE, NOT MACHINE SPECIFIC

	LIST	SALE
Amdek		
300 (12" green)	175	142
Color 11 (R&G)	899	645
Corona Data Systems		
11M8 Hard Disk	3295	2695
20M8 Hard Disk	4295	3495
6M8 Hard Disk	2295	1895
PC Interface,Cable,Man.	300	239
Corvus Systems		
11M8 Hard Disk	3295	2695
20MB Hard Disk	4295	3495
6MB Hard Disk	2295	1895
Hayes Microcomputer Products		
Chronograph	249	199
Smartmodem 1200	699	509
Smartmodem 300	279	209
NEC		
Monitor 12" Green Hi-Res	285	167
Novation		
J Cat	149	119
Smart Cat 103	259	207
Smart Cat 103/212	595	476
Quadrum Corp.		
Microfazer	189	160
Microfazer, in-line serial	330	270
Microfazer inline paralle	225	185

® = Microsoft is a registered trademark

Orders must be **PAID** by **October 31** to qualify for these special prices

TELEPHONE ORDERS

Outside Calif.: **(800) 222-8811**
Inside Calif.: **(415) 324-3730**

Order lines are manned 6:30—6 Monday thru Friday and 9—5 Saturday. Other lines are open 9—5 Monday thru Friday.

Technical Support ***(415) 324-0311***
Order Status ***(415) 324-0306***
Sales Manager ***(415) 324-0305***

More CP/M® , APPLE® , IBM PC™, UCSD p-System™ software, hardware, etc.: call for quote.

TERMS: All prices subject to change without notice and avialability. Cashier's check/MO/bank transfer. Allow time for company or personal checks to clear. Prices reflect cash prepaid discount. VISA/MASTERCARD/COD/PO's + 3%. CA residents add sales tax. All sales final for games & special orders.

SHIPPING: $3 per item for UPS surface ($6 for Blue Label) within Continental USA, except where shipping cost is specified in square brackets. UPS does not go to Canada, Alaska, APO's, FPO's; call for ship charge or add 15%—we will refund/credit difference.

RETURNS: Must have authorization number, obtained at 415-324-0305. Unauthorized returns will be refused; damaged goods will be refused. All returns subject to 15% restocking fee. No return after 30 days.

PROGRAMMING INTERNATIONAL
505 Hamilton Avenue Suite 301
Palo Alto, California 94301

Also available at

Software to go

Call (800) 222-8811, (415) 324-1099, or local information for Software to go location nearest you. Software to go prices may differ slightly Local sales tax applies.

OPENING SOON

California
- Los Angeles
- Orange County
- San Diego
- Palo Alto

Illinois
- Chicago

New Jersey
- Camden
- North Jersey

New York
- Manhattan

Texas
- Dallas-Ft. Worth
- Houston

to serve you better!

The First Portable Computer

The genesis of SCAMP, grandfather of the personal computer

Jonathan Littman





History is the last thing that comes to mind when we think of computers. Computers are synonymous with change and obsolescence. Many of us who have grown up with or adapted quickly to computers have forgotten what life was like in the stone age of the typewriter and the hand-held calculator. We sit before our personal computers and, like the man driving a Cadillac, have no idea of what life was like in a Model T with its hand-cranked engine and other curious features.

In 1973, when hand-held calculators were becoming popular, the concept of a portable personal computer did not exist; nor was there a reason why anyone would want such a machine. This was unimportant to Dr. Paul Friedl of the Palo Alto IBM Scientific Center.

Not all computers are built by whiz kids who retire at 30 to live off their investments. Dr. Friedl is 50, a family man with three sons and a daughter about to be married. Friedl did not spend his youth playing video games or punching computer keyboards. Those technologies were years in the future. He played baseball.

Friedl became acquainted with computers in an informal way. He studied chemical engineering at the Case Institute of Technology, earning his Ph.D. in 1960. One day, as he relates it, "I found a notice on the board that there was going to be a demonstration of an electronic computer. It was an analog computer, and afterward I thought I knew all about computers. Much to my confusion, the next week there was a demonstration of yet another computer—the digital computer." That computer was an IBM 650, and it caught Friedl's fancy.

Friedl began taking computer classes but rarely saw a computer. Students did everything at a desk. They wrote the program and hand debugged it, all with a graduate student peering over their shoulders. When they finally thought they had the program right, they took it up to their favorite keypunch operator who checked it again and then said something like, "Yeah, that should work." Then, as Friedl says, "The great day came when they would even let you into the same room with the machine. You approached it like the Wizard of Oz—big doors opening up, fans going, tapes spinning, and lots of noise. Then someone took your card, put it into the hopper, and hit the button. The machine went 'chun, chun, chun' and the computer operator said, 'Well, that's the right answer...next.' I said, 'Wait a minute, you mean it's done already?' 'Sure, why not?' " Friedl was hooked.

His friends could never understand why he spent so much time with the computer. They asked why he wasn't boiling oil, pulverizing atoms, or doing something "modern." Instead, he started developing a specialty in computers and became interested in the potential of using the computer for process control in chemical engineering.

Friedl never forgot that IBM Wizard of Oz. After graduating he went to work for IBM Advanced System Development, joining a new group that was studying process control. Prophetically, because of the success of his process control work and long before a personal computer even existed, Friedl became known as Mr. PC. After leading several projects in advanced computer control, he joined the fledgling IBM Scientific Center. He became the Project Leader on applying real-time computers to high-energy physics. In the late '60s, he worked on several projects with microprocessors.



SCAMP, grandfather of the IBM PC

Project SCAMP

In December 1972 Friedl was sitting in for his boss when he received a call from the IBM General Systems Division in Atlanta. General Systems wanted to see if it could raise the visibility of APL (A Programming Language) in its division product line. Friedl's name had been advanced as someone who knew about microcomputers. Two executives flew out to California the next day to ask Friedl if he could come up with something using APL. "We don't exactly know what," they said, "maybe something similar to a hand-held calculator." When Friedl told them that he would love to work on the project, they asked when he could come back with a proposal. He said one month.

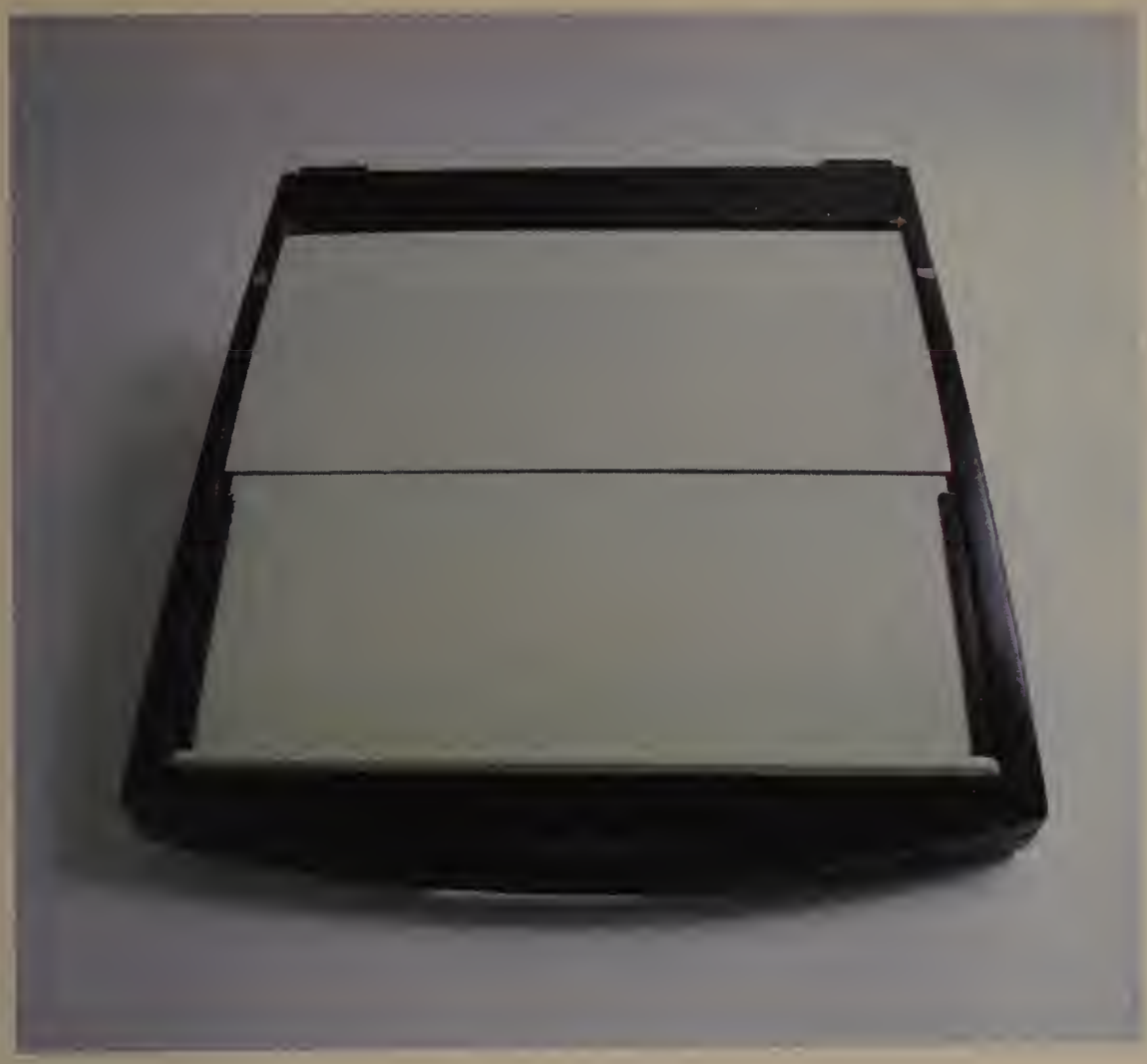
Friedl had the notion of a portable personal microcomputer, but it wasn't going to be easy to get the most out of a full-fledged high-level language like APL. The technology didn't seem ready. What was needed was a display, keyboard, printer, and a magnetic data storage device. At this time there were no floppy disks, just big bulky tape drives, and the idea of a portable display was rare.

> His friends could never understand why he spent so much time with the computer.

Friedl had to devise a useful machine, while somehow circumventing the typical five-year development cycle. Says Friedl, "The first thing I did was enlist the help of an excellent programmer-engineer, Pat Smith. We considered a number of IBM and other technologies already in existence that we could incorporate into the machine. Fortunately, we didn't have to create a new microprocessor for the computer."

IBM manufactured a suitable processor, the PALM microcontroller that was designed to control other elements of a microcomputer. It offered Friedl the flexibility he would need to make an all-purpose machine, incorporating within its architecture the notion of an integrated raster (TV) display. He used a standard IBM keyboard and 64K of RAM (more memory than many of today's computers). Curiously enough, the memory cards were called Snoopy Cards, and since they were 16K each, only four were needed. The last basic piece of hardware was a new I/O card that allowed the computer to hook up to a printer, audio cassette recorder, and keyboard.

On January 22, 1973, with his ideas sketched on paper, Friedl took his plan for a portable computer to



The portable SCAMP prepared for travel

Atlanta. He told IBM executives that the only way to demonstrate the feasibility and uses of a portable computer would be to build one. When asked how long it would take, Friedl said six months.

At 30,000 feet, on the plane back to California, Friedl began to wonder what he had gotten himself into. He already had a full-time job, yet he had just agreed to build something that had never been built before. "I was excited about the project, but I can't figure out why I said six months. I didn't have a single worker or the assurance that it could be built in two years, let alone six months.

Friedl needed an engineering team. He went to see Joe Ma, engineering manager at IBM's Los Gatos Advanced Systems Development Laboratory. Ma had a big blackboard in his office. Friedl said, "Can I erase your board Joe? This is what I want to build...." He sketched the whole thing out. When he was finished, Joe said, "Boy would that be fun." Joe George, who had been working on a printer adapter for the PALM microcomputer, came in to look at the sketch. Friedl asked him if he thought it could be built. George nodded. Then he asked George how long he thought it would take. George paused and then calmly said, "Six months." Friedl breathed a sigh of relief.

Not only was Friedl blessed with available technology, he was also fortunate to have a tremendous team. Joe George had recently joined the staff of an IBM knight, Roy Harper (IBM "knights" a few of its exalted workers, allowing them to work on virtually any technical project, or "dragon," they wish). Because the knight was between dragons, George was able to work with Friedl. In only two weeks Friedl rounded up five engineers and five programmers. The project was christened SCAMP (Special Computer APL Machine Portable).

That was only the beginning. As Friedl says, "Once everyone else was busy making the system, I started thinking, 'so what! Why would anyone want such a thing? What possible use could a manager have for a portable microcomputer?' I was trying to figure out how to make it more than just a magical black box.

"I was thinking about six months into the future, when SCAMP would be sitting on the executives' desks. I realized that I never wanted them to be faced with a blank screen. The system should tell you all the possible choices you can make. I wanted menus, so that someone who had never used a computer could read the choices, make their decision, and then press the appropriate key. Originally, I thought up four or five possible applications, such as computer-aided instruction, project planning, and financial analysis." Friedl even developed word processing, but the APL implementation of the word processing was, as Friedl says, "horrendously slow." Instead, he created what was probably the first electronic spreadsheet.

A full three years before *VisiCalc* was born, SCAMP was able to do much of the financial modeling found only in today's modern financial programs. Says Friedl, "While the small display allowed you to see only a window of 16 rows down and 64 columns across at any one time, your spreadsheet could actually be much larger. With the power of APL it was a trivial matter to do some of the basic modeling and calculations you find in modern programs." Friedl had an old picture of SCAMP, and sure enough, the display showed the year, 1973, with months going across the screen and financial categories listed in the left corner.

SCAMP's Test Run

Six months after his promise, virtually to the day, Friedl and Joe George were on a plane to Atlanta taking the world's first portable computer on its maiden voyage. While

JOIN THE PROFESSIONALS

RTCS Products give your PC/MDOS computer, professional program development capabilities, just like Intel's Series III or System 86/330.

RTCS offers a family of Operating System Development Tools.

RTCS UDI

The UDI allows your PC to execute Intel's Compilers, Assemblers and Utilities.

Features:
- Memory Management
- File Management
- PC/MSDOS File Structures
- 8087 Support

REDUCED! ~~$995.00~~ $500.00

RTCS PC/RMX

The RTCS PC/RMX lets your PC run under Intel's Real-Time Operating System, iRMX.

Features:
- Up to 65536 tasks
- Hierachial Directories
- Multi-User Capabilities
- Supports IBM Peripherals
- Hard Disk Support
- Ethernet Support

$2250.00

RTCS UDEBUG

THE RTCS UDEBUG is a powerful system debugger. 8087 support. Symbolic debugging.

REDUCED! ~~$750.00~~ $195.00

RTCS PC/SBC Execution Vehicle

The PC/SBC allows your PC to control the execution of any of Intel's SBC Computers. Both download and upload capability.

REDUCED! ~~$750.00~~ $195.00

MDOS IS A TRADEMARK OF MICROSOFT CORP.
SBC & iRMX ARE TRADEMARKS OF INTEL CORP.

RTCS

REAL–TIME COMPUTER SCIENCE CORPORATION
P.O. Box 3000-886 (805) 482-0333
Camarillo, CA 93011
TELEX #467897

Reader Service #163

Community

Friedl had planned well ahead for this day, it wasn't until he saw the executives staring up at him from the conference table that he realized the enormity of his task. Says Friedl, "I had planned numerous applications for the executives to do on SCAMP. Talk about apprehension. These poor people had either never had typing or the skill had evaporated. And then, all of a sudden, to have something thrust at you—here is the keyboard—and your peers waiting for the slightest mistake. It was terrifying for some of these executives. All they had to do was press a letter or number, but there were questions such as, 'Where is the A key?' One man broke into a sweat when I asked him to type his name."

People had difficulty understanding SCAMP. Friedl remembers one executive saying, "Gee, that thing almost does what a computer does!" Says Friedl, "We had to convince him that it was indeed a computer." C.B. (Jack) Rogers, president of the General Systems Division, liked the machine and wanted every manager in the Atlanta headquarters to take part in a demonstration. Everything went well until Friedl got fancy and tried to show them how portable it was: "I reached for the handle and pulled it shut, and said, 'See, now the computing goes with you!' While everyone was clapping and shaking hands, I was wincing inside. I was sure I heard a crunch as I closed SCAMP. I tried to grab Joe George as unobtrusively as possible. We tried repowering the system but got nothing. Joe pulled the back off and announced that it was dead. I said 'What do you mean Joe?' He then explained that I had sliced the cable for the keyboard. The executives were starting to look overly curious, so we asked them if they would give us 20 minutes alone with SCAMP. And so, in a fully enclosed, oak-paneled conference room, we opened SCAMP's guts on the huge walnut table and pulled out the soldering gun—talk about smoke!"

That was not the first time Friedl was concerned about his electronic baby. Before SCAMP left for its maiden voyage, Friedl was called over to the Los Gatos laboratory. The next day he was to fly to Atlanta to give the opening demonstration to Rogers. Says Friedl, "They had made a special wooden case for SCAMP. It was two toned with nice wood and was quite attractive. I was standing there admiring SCAMP when Joe walked up and said, 'Watch this,' and gave SCAMP a little kick. I felt like screaming. The whole project was about to go splat on a hard tile floor.

We opened SCAMP's guts on the huge walnut table and pulled out the soldering gun—talk about smoke!

And then I couldn't believe my eyes. Instead of going crunch, SCAMP just sort of sighed to the floor, rocking back and forth like a baby carriage. Jerry Garvis, an industrial designer, had created a special curve to give it a dampening effect. Of course, nobody had told me."

Excluding the initial cable-slicing incident, Friedl went on to give over 100 trouble free demonstrations. Exhausted, Friedl was at home enjoying his first real weekend in months. The phone rang. It was Atlanta. Friedl was to get on the next plane. It was time for the ultimate demonstration. John Opel, the president of IBM, wanted to meet SCAMP.

By Monday afternoon Friedl was in the conference room of division headquarters in Atlanta. The room

was full of executives peering nervously at the darkening thunder clouds. Friedl describes the situation: "Opel had to give a speech later that evening in Atlanta. He was going to take a company plane to Atlanta and then drive out to headquarters. With the storm gathering, we knew planes would be stacked up over the airport. We started to realize that he wouldn't have time to drive all the way out to headquarters and still get back to Atlanta in time for his speech.

"An IBM vice-president took over. He started pointing at people, saying, 'You get us a room at a hotel at the airport! You get all the flip charts! You pack this machine up! And you, meet him at the airport!' In a couple minutes they were all running down the hall. They had forgotten all about me. I yelled out, 'Where are you going?' and they cried back, 'The Hyatt on Peachtree Street.' "

An hour later, in the middle of a downpour, Friedl had driven down just about every Peachtree Street in Atlanta. Finally, he found the hotel, parked across the street, and ran through a thunder shower to get there. Says Friedl, "I was hoping to give a nice polished demonstration, but I was leaving a trail of water behind me. As I came down the hall, they called out, asking where the heck I'd been. Luckily, there wasn't time for explanations. I powered up SCAMP, and just as the menu came up, Opel walked in." Opel then pulled up a chair, and the two of them sat down next to SCAMP in the middle of a large dining room. SCAMP performed beautifully.

When the demonstration was finished, Opel said, "It's all very interesting." Then Dave Slattery, a vice-president, spoke up, "We'd like to get financial backing to go ahead with the project." There was an agonizing silence. Finally, Opel said, "Don't look at me—I don't have any money." Then, after another lengthy pause, Opel said, "Why don't you just go over budget."

ANNOUNCING AN INNOVATION IN TYPING INSTRUCTION.

FUN.

Now PC owners can learn keyboard skills like never before, with MasterType.

MasterType is the typing program that dares to be fun. It combines the fast action of video games with the best instructional program available. The results? Highly motivated and enjoyable learning.

Two programs on one disk. One for the office, one for the home.

Whether you use your PC at home or in the office, MasterType is for you. The color version will dazzle your children as it teaches them to type. The monochrome version doubles your return by improving your productivity at the office. MasterType is one of the best software investments you can make.

But don't just take our word for it.

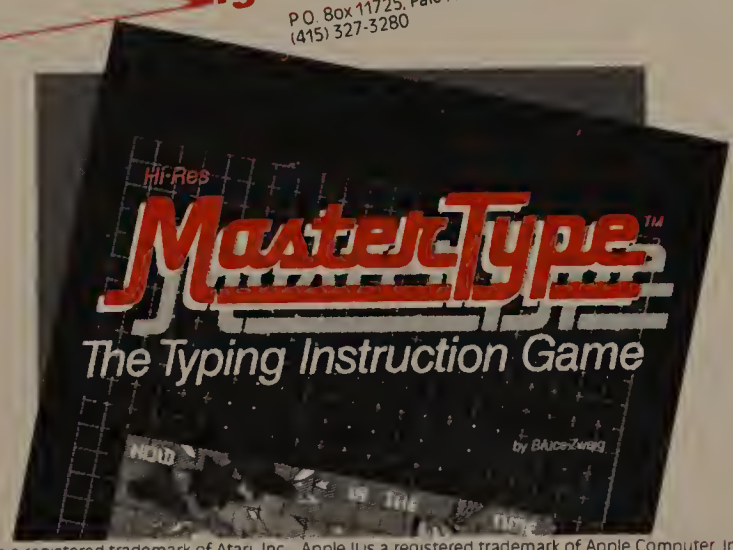
Infoworld was impressed by MasterType's ability to teach and entertain. They wrote: "MasterType is an excellent instructional typing game. We had fun reviewing it, and we highly recommend it to those who want to learn typing in an unconventional but motivating way."

Infoworld also went on to rate MasterType as Excellent in all four of its review categories.

Order MasterType Today.

MasterType has 18 explosive keyboard lessons to making typing a blast. $49.95 for the IBM PC. Requires disk and 64K.

Lightning Software ©
P.O. Box 11725, Palo Alto, CA 94306
(415) 327-3280



Atari is a registered trademark of Atari, Inc., Apple II is a registered trademark of Apple Computer, Inc.

Reader Service #94

yes Take Our Yes
Sundex
'YES' Test
$19.95

Easy-to-use computer software? YES! It's our Certified Personal Accountant™ program, a personal finance manager, with on-line tutorial and on-line help. . .a clearly written, illustrated manual easy to follow instructions and examples.

Will it help me with—

TAXES? **YES!**
Tax categories match those on IRS form. Organize your records now and relax April 15th!

FINANCIAL INFORMATION? **YES!**
Cash flow, net worth, and budget reports. . .and you'll think of more!

BILL PAYING? **YES!**
Remembers amounts, due dates for regular payments. Handles credit cards, checking and saving accounts, cash, money market funds. Easily splits transactions into multiple budget and tax categories. Prints any type of check—personal or continuous form—with addresses.

ONLY $19.95 TO TRY IT? **YES!**
Send $19.95 and we'll send you our Certified Personal Accountant™ program on a trial basis. Use it. Try all aspects of the program. When you decide to buy, just call us toll free. Now put us to the test. . .say **'YES'** to easy-to-use software!

☐ **Yes, I want to take advantage of your TRIAL OFFER—$19.95**
☐ **I'm convinced, send me your Certified Personal Accountant™ Program**
—$99.95 for computers in category 1
—$149.95 for computers in category 2

Specify: Category 1 ☐ Osborne ☐ Apple II/IIe
Category 2 ☐ IBM 128K ☐ IBM 64K
☐ COMPAQ ☐ Eagle
☐ TI Professional 128K

Payment: Check VISA MasterCard
Colo. residents add 3% sales tax

Card# _____ Exp. Date _____

Signature _____

Address _____

City _____ State _____ Zip _____

Mail to: Sundex Software Corp.
Dept PW093
3000 Pearl St.
Boulder, CO 80301

Sundex
Phone orders: 1-800-835-3243
In Colorado call: **1-303-440-3600**

Reader Service #363

Community

Ancestor of the PC

IBM went on to develop the progeny of SCAMP, the 5100, consulting with Friedl on a number of issues, including some experimental applications software. With the help of a class of students at Stanford, Friedl developed a set of interactive statistics programs. He devised a menu-driven system that had the capability of capturing each entry, allowing you to see the sequence of keys you pressed. The system was ideal for identifying where you made your mistake.

Some time after the last demonstration for Opel, when all the excitement had died down, Friedl's chief programmer, Pat Smith, returned from a vacation in Hawaii. Friedl called him up and invited him to sit in on one of the demonstrations he had done countless times. Smith accepted. Friedl was running through the different applications and was about to show Smith the hold key, which acted just like an interrupt key. If you were scrolling information up, it would freeze the screen. When you wanted to see more, you just pressed it again. As Friedl reached out to press the hold key, Smith grabbed his hand: "Don't press that key. I was trying to debug that thing before I left, but I just couldn't get it fixed in time. It doesn't work."

Friedl wasn't convinced: "That can't be, Pat. I used it in over 100 demonstrations and never had a problem. Watch." Friedl pressed the key, and the screen went poof—system blowout. He couldn't believe it. The system took over five minutes to reboot. If that had happened during the demonstrations, it would have been the end of SCAMP. They tested the key over and over again, but a blowout happened almost every time. To this day they haven't figured the problem out. As Friedl says, "It must have been a certain sequence that, by some stroke of luck, I didn't repeat in the other 100 demonstrations."

Despite all its triumphs, SCAMP was almost thrown out with the trash. When the project was finished, Friedl went on with his work and forgot all about the wooden-encased computer that had consumed his life for over six months. He became curious about the whereabouts of SCAMP when a colleague showed him an article proclaiming that the 5100 was the world's first truly portable computer. What the writer didn't know was that the portable computer technology of the 5100 evolved from SCAMP. Says Friedl, "I always felt the work we had done was worthwhile. But with the explosive growth of personal computers, I suddenly thought that perhaps we had played some historical role in that popular movement."

Friedl called up the Los Gatos lab and asked if SCAMP was still there. IBM technicians told him that it was, and if he wanted it he had better come quickly because they were just about to throw out a lot of junk. "I jumped in my car and drove over there. We searched back in the corner of the lab and finally found SCAMP covered with dust and cobwebs behind a work bench. After all that time, we plugged it in and it started right up, a tribute to all the fine people who worked on the project."

And so SCAMP was born, the father of the 5100 and grandfather of the IBM PC. Although SCAMP was based on a technology that preceded the age of floppy drives and 16-bit processors, the lineage is clear. Sometime when you're feeling nostalgic, look at the back of your PC. Right above the power plug are the numbers 5150, child of the 5100, grandchild of SCAMP.

Jonathan Littman is a freelance writer who is working on a book about IBM PC communications. He also conducts training seminars on WordStar *and develops educational software.*



YOU, YOUR IBM™ PC, AND COMPUSERVE, MAKING EXECUTIVE DECISIONS TOGETHER.

Introducing CompuServe's Executive Information Service

To Help the Over-Achiever Handle the Overload.

If you're tired of having your answers questioned or waiting to have your questions answered, here's on-line support for you and your IBM™ PC, from the same communications professionals who provide business information services to over one fourth of the FORTUNE 500 companies.

CompuServe has more of the services and specific information that you need. For state of the art communications, you get InfoPlex™, the easy to use electronic mail service, and E-COM™ to link your PC to the U.S. Postal Service for quick, inexpensive hard copy delivery. For in-depth financial data, there's Value Line, Standard and Poor's, and up-to-the-minute quotes plus current and historical information on over 50,000 companies and issues. Site-Potential™ is a demographic database that gives detailed census information and sales potential projections for any area of the country you choose.

The Executive News Service brings you the impressive resources of the Associated Press wire services along with a unique clipping capability that automatically selects articles on topics of your choice and stores them for your own "file."

There are professional forums, bulletin boards, the Official Airline Guide Electronic Edition, an on-line travel agency, and listings of airport delays.

And the new CompuServe software especially for the IBM PC makes this the simplest, most time efficient on-line service ever for the busy executive.

So, decide now to inquire about CompuServe's Executive Information Service. It makes every other decision a lot easier.

To get your CompuServe Executive Information Service Inquiry Kit, contact or call:



CompuServe

Executive Information Service
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, Ohio 43220

800-848-8199
In Ohio, call 614-457-0802

Reader Service #362

IBM is a registered trademark of International Business Machines Corp

INTRODUCING A
IN SOFTWARE

FREEDOM

Media Systems Technology offers you Freedom of Choice...If you need to duplicate and distribute software—MST is the company to support you. Hardware systems to automate your production or total software publishing services. MST's systems and services now support all facets of your software manufacturing.

Media Systems Technology is the leading manufacturer of automatic diskette duplication equipment. With over 5 years experience in the industry, supplying systems and support to IBM, DEC, 3M, Apple, Hewlett Packard, Peachtree...We understand the rigorous requirements of software manufacturing.

HIGH QUALITY DUPLICATION SYSTEMS

MST manufactures systems for 8," 5.25" and 3.5" media that support every major format. What's more, we provide technical expertise to develop unique proprietary formats—under complete non-disclosure.



MST's mini computer-based systems are configured to automatically duplicate and provide 100% verification of 1000's of diskettes a day in a high volume production environment. For lower volume requirements, our automatic desktop copiers can duplicate and verify a wide range of formats including Apple, IBM, DEC, HP, to name only a few. Designed—in test parameters insure the highest quality for your software product.

NEW CONCEPT DUPLICATION:

OF CHOICE.



TOTAL SOFTWARE MANUFACTURING SUPPORT

Media Systems Technology recognizes many companies prefer to have a third party handle software production. We offer complete software manufacturing capabilities—on the East and West Coasts. With our track record at so many major hardware and software companies, we can provide you with the most complete support in the industry.

Duplication, serialization, copy protection, format development, packaging design, documentation printing, and product assembly all under complete confidentiality. By MST providing these services, you reduce fixed costs, control distribution, lower inventory and most importantly, realize rapid turn-around time of a high quality finished software product.

Again, whether your needs are hardware or software publishing services—MST is the company to offer you Freedom of Choice.

For more information, please call or write to us at the offices listed below.

Corporate Headquarters
16950 Armstrong Ave.
Irvine, CA 92714
714/863-1201

East Coast
100 South Street
Hopkinton, MA 01748
617/435-5381

MST™

Media Systems Technology, Inc.

Reader Service #352

Rana Systems.
Always A Step Ahead.



And it's happening again with our IBM® compatible Rana 2000. This 320K double density drive offers a large centering cone for problem-free diskettes and our exclusive silencing mechanism to make it the quietest disk drive you can buy.

At Rana we know the key to our success is providing the highest technology, on the best possible products, while filling the most possible user needs. That is why we spend so much time on research and development. Our world-renowned engineers were the first to offer increased capacity. The first to design a write protect feature. The first to use a metal band positioner and get 100% data integrity, and a 3 to 4 times improvement in access speed. And, the first to bring you all this performance, quality and dramatic styling.

This is why our Elite One got the #1 rating from Softalk Magazine. And our Atari® compatible Rana 1000 Slimline has turned a game computer into a sophisticated business tool. And soon we'll have a new Winchester drive and a new series of very high density minifloppies, for both IBM and Apple®.

So call or write for the nearest Rana retailer or computer store. We're Rana Systems. And we know that to keep a step ahead, we have to put you first.

RanaSystems

21300 Superior Street, Chatsworth, CA 91311 213-709-5484
Call toll free: 1-800-421-2207. In California only call. 1-800-262-1221
Source Number: TCT-654

*Apple is a registered trademark of Apple Computer, Inc. *Atari is a registered trademark of Atari, Inc. *IBM is a registered trademark of International Business Machines, Inc.

© 1983 Rana Systems

Reader Service #388

BBS Watch

A closer look at asynchronous communications

Gene Plantz

A recent attempt at telecommunications by two IBM PC operators was unsuccessful until the receiving operator realized that the sender didn't have his telephone line plugged into the modem. I wish all such problems were as easily solved, but the truth is that asynchronous communications can be confusing. Using your PC to communicate is not as simple as talking on the telephone. The telecommunications parameters of parity, number of data, start and stop bits, and baud rate are among the least standardized in the computer community.

If you understand some of the terms and concepts used in asynchronous communications, you should be able to upload and download files more easily from bulletin boards and access time-sharing systems like The Source and CompuServe.

Transmitting Data

Asynchronous communications is a type of serial communication, which means that the bits that make up a character are transmitted sequentially. In asynchronous communications each character of data is broken down into a series of bits by the sending computer and transmitted over the telephone line to the receiving computer, which puts the bits back together to form the original character.

In such a data transfer 10 or 11 bits are grouped together and transmitted sequentially. One or 2 start bits begin the series; these bits signal the receiving computer that a new character of data is about to be sent. Seven information bits, representing control and alphanumeric characters, follow; an additional bit is often used for error checking. Bringing up the rear is the stop bit, which signals that an entire character has been transmitted.

The most common way to transmit asynchronous data is via the RS-232C standard developed by the Electronic Industries Association (EIA). This standard specifies a set of signals that are transmitted through a 25-wire cable. Each signal is transmitted through a predetermined wire. When transmitting or receiving data in this format, your IBM PC must be equipped with an RS-232C port, such as the IBM Asynchronous Communications Adapter.

A Universal Asynchronous Receiver Transmitter (UART) chip controls the RS-232C port. The UART chip is the heart of the asynchronous communications process and acts on the commands and parameters that you issue to your communications software. In most PCs the Intel 8250 chip handles the UART duties.

Parity

A method of error detection called parity checking is often used during asynchronous communications. Both the sending and receiving computers must use the same parity setting, which is either even or odd. When parity checking is used, the receiving computer calculates the sum of the bits in each transmitted character. If the parameter setting specifies odd parity, for example, the character's sum must be odd, or the receiving computer will interpret the eighth bit as bad parity and signal an error. If the sum of a character's bits is even, the sending computer transmits an extra bit with the character to make it conform to the parity setting. If a BBS uses an even parity setting, the computer adds 1 bit to a character if its sum is odd.

If the parity parameter you select does not match the remote computer's setting, the data you see on your monitor during transmission will be garbled. In such a case you should try a different parity setting and attempt to receive the files again.

Although computer hardware and software can detect transmission errors when sending data, most communications programs are written to ignore these errors. Time-sharing services and most bulletin board systems simply send the data to your PC; it is up to your communications program to report parity errors.

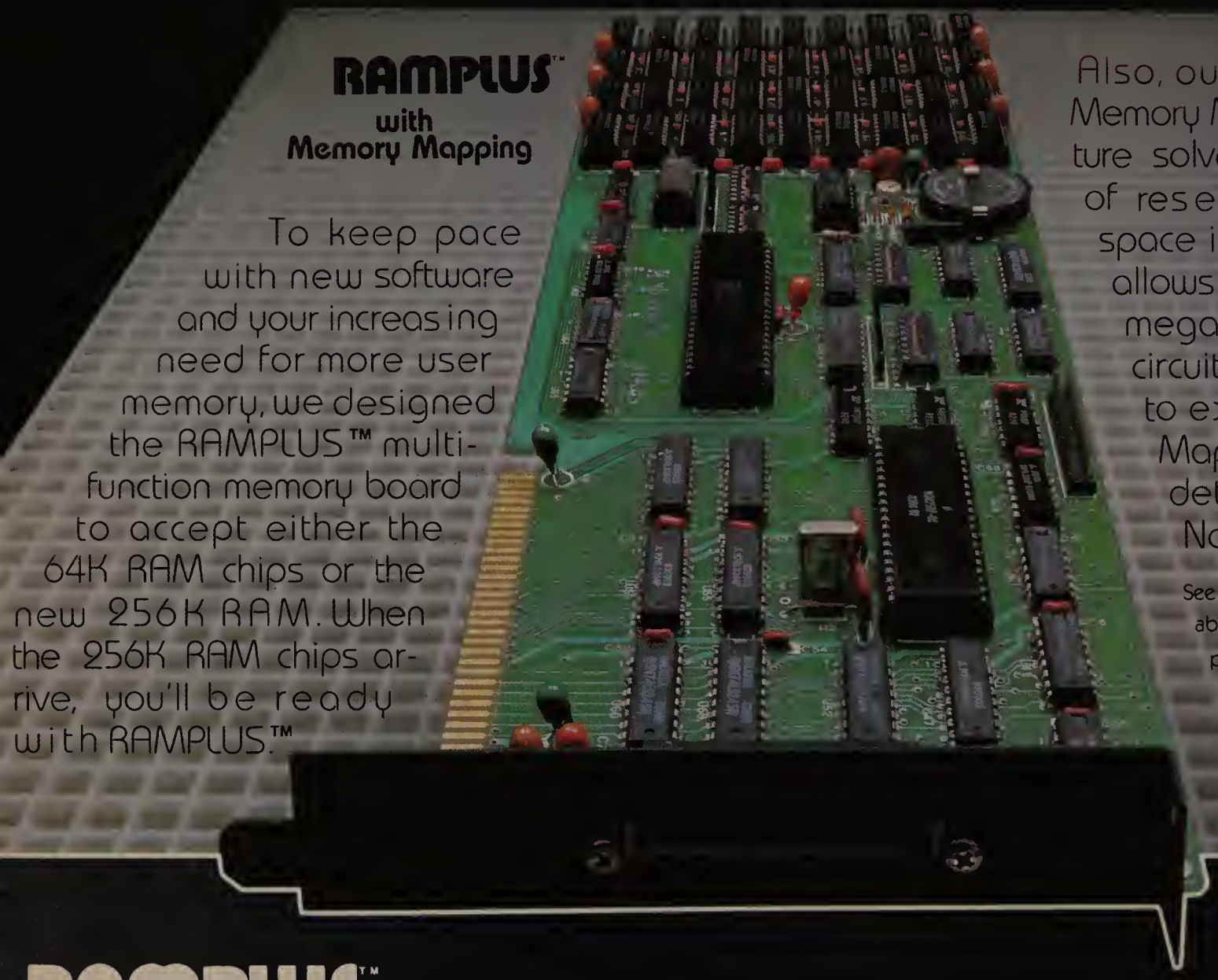
Noise or static on the telephone line can cause parity errors during file transfer. Your communications software can only signal that an error exists; it cannot tell you where in the file the error can be found. So if your program reports a parity error, you should upload the entire file again.

Troubles in Parity-dise

When you are transmitting binary files such as .COM or .EXE program files, a no parity setting is used. Because binary (non-ASCII) files make use of the eighth data bit in a character, parity checking cannot be used when they are transmitted. The trouble, of course, is that no error checking takes place during telecommu-

A Million Bytes for Your IBM PC

REBATE!
The 256K chips are here.
Ask about our rebate.



RAMPLUS™ with Memory Mapping

To keep pace with new software and your increasing need for more user memory, we designed the RAMPLUS™ multi-function memory board to accept either the 64K RAM chips or the new 256K RAM. When the 256K RAM chips arrive, you'll be ready with RAMPLUS.™

Also, our exclusive Memory Mapping feature solves the problem of reserved memory space in the IBM PC and allows you to use a full 1 megabyte of RAM on one circuit board. We'll be glad to explain our Memory Mapping feature in more detail. Ask for Technical Note No. 2871-1.

See your dealer for orders and information about RAMPLUS™ and our other PC Computer Components — Combiboard™, Fleximem™, Digiboard™, Digiquad™ and Dynadisk™.

RAMPLUS™ Multifunctions

- 64K-256K expansion memory (expandable to 1 megabyte with 256K chips)
- Serial port - RS-232 compatible
- Parallel printer port - IBM hardware and software compatible
- Clock/calendar with battery backup

Dealers and distributors call **VITEK** toll-free, **(800) 237-3443.**
California, call **(800) 237-7290.**

Or contact us directly

Reader Service #155

Raytronics

(800) 854-1085

4901 Morena Blvd., Bldg. 900, San Diego, CA 9211

IBM is a registered trademark of International Business Machines Corp. RAMPLUS, Combiboard, Fleximem, Digiquad, and Dynadisk are trademarks of Raytronics.

Reader Service #155

nications. To solve this problem Ward Christensen (co-creator of the first BBS) developed the Modem/Xmodem file transfer protocol for CP/M systems (see *BBS Watch, PCW,* Vol. 1, No. 3).

With this protocol the sending computer divides the file into 128-character blocks and sends each block with special characters and numbers at the beginning and end. One important piece of information sent with each block is a computed checksum character—the sum of all bits in the 128-character block.

The receiving system accepts each block of data along with the checksum character, performs the same addition calculation, and compares the result to that sent with the data. If the checksum numbers match, the receiving system sends a positive acknowledgment, signaling the sending system to transmit the next block of data. If the numbers do not match, a negative acknowledgment is sent, signaling the sending system to retransmit the same data block. This process continues until the entire file has been sent and the sending system transmits an end-of-file signal.

The Modem/Xmodem protocol has been adapted by several communications programs for the IBM PC. Many BBSs are also beginning to use this file transfer method. The protocol requires the parameter settings of 8 data bits, no parity, and 1 stop bit.

The ability to change parameter settings is an important feature to consider when you are purchasing a communications program. The better communications programs on the market have this flexibility. Some programs even include directories that enable users to store parameter settings with the phone numbers for each listing.

Standard Parameters

The question "Which settings should I try first?" is difficult to answer because the standard seems to change every few years. In the past the use of 7 data bits, even parity, and 1 stop bit (7E1) was the norm. Now a significant number of popular systems, such as The Source and most IBM PC bulletin boards, are using or switching to 8 data bits, no parity, and 1 stop bit (8N1).

If you have trouble when first calling a system, try again with a different parity and data bit setting. The 7E1 and 8N1 settings are the most common, so try them first.

If you have any trouble, please let me know. Send correspondence to Gene Plantz, P.O. Box 95638, Hoffman Estates, IL 60195. CompuServe EMAIL 70040,245; The Source SMAIL STG476; Delphi MAIL TDCINC.

IBM PC Bulletin Boards

Following is a partial listing of the IBM PC bulletin boards on-line in the United States. The list is updated as the author receives information about new bulletin boards.

203/289-6321
East Hartford, Connecticut
SYSOP: Scott Maentz
6 p.m. to 9 a.m. Mon-Sat, all day Sun, download & upload, messages, 300/1200

213/371-8825
Culver City, California
SYSOP: Marc Schoenberg
24 hrs, download & upload, messages, 300/1200

213/390-3239
Source: TCG147
Santa Monica, California
SYSOP: Marc Schoenberg
24 hrs, download & upload, 10M disk, 300/1200

213/649-1489
Culver City, California
SYSOP: George Peck
24 hrs, download & upload, messages

215/250-0173
Easton, Pennsylvania
SYSOP: Jerry Lotto
24 hrs, download & upload, 300

301/251-6293
Gaithersburg, Maryland
SYSOP: Larry Jordan
24 hrs, communications info
(Passwd = IBMPC)

301/949-8848
Rockville, Maryland
SYSOP: Rich Schinnell
24 hrs, download & upload
(Passwd = IBMPC)

301/460-0538
Bethesda, Maryland
SYSOP: Ramona Landberg
24 hrs, upload newsletter articles

(continues)

SURVIVAL IN SOFTWARE

... OR ... HOW TO SUCCESSFULLY PACKAGE YOUR PROGRAM FOR INVESTORS AND CONSUMERS.

The Center for Resources in Technology (CRT) is now accepting applications for participation in the most definitive and intensive working seminar available in the industry. This seminar is designed by investors and marketing specialists for software programmers, analysts, and start-up companies seeking specifics in financing and marketing.

Bring nothing but your desire to work. CRT will provide everything, including:

- Comprehensive workbook
- Diskette with pre-programmed files of a formulated business plan and a financial spreadsheet designed by investors
- Complete checklists and step-by-step procedures
- Detailed marketing planners and resource materials

One Day Seminar—3 Dates Only

Thursday Sept. 22 • Friday Sept. 23 • Monday Sept.26

Hyatt Hotel
4290 El Camino Real, Palo Alto, CA

MORNING SESSION (8AM-NOON)

Types of Financing • How to write a business plan that works • How to talk with investors • What to give and what not to give • Locating investors.

SPECIAL LUNCHEON SPEAKER: (TO BE ANNOUNCED)

AFTERNOON SESSION (1:45PM-5:00PM)

Market on your own or through a publisher • Product image • Packaging • Choosing an agency • Sales and distribution • Planning a budget.

HOSTED COCKTAIL RECEPTION WITH INVESTORS (5:00PM)

CRT has arranged for informal introductions between interested participants and successful software investors at a special cocktail reception following each seminar.

LIMITED SPACE. MANDATORY PRE-REGISTRATION.

To provide maximum benefits from the sessions, space is strictly limited. Although everyone interested is welcome, the sessions are open primarily to those companies or individuals with software products in development. The full-day seminar price includes all materials, lunch and the cocktail reception. Your completed registration form with date preference will be held until all applications are received and space assignments are confirmed (at least one week prior to the seminar). Priority will be given to programmers, analysts, and companies with a specific product, according to the date application is received.

Please complete all information and mail with your check so that it is to be received no later than September 7, 1983. Return to:

Center For Resources In Technology
1720 So. Amphlett Blvd., Suite 120
San Mateo, CA 94402
(415) 345-5700

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone: Day _____ Night _____

Nature of Company _____

Type of Product _____

Seminar Cost-$325. per person.
Additional attendees from same company $275.
(Please list additional names/titles.)

_____

_____

_____

_____

Date Preference (1-3)

Thursday 9/22 _____

Fri 9/23 _____

Mon 9/26 _____

☐ If you can't attend and wish copies of materials and audio cassettes of both sessions, check here and send $176.00 for each set. Allow two weeks delivery from seminar dates.

CRT
Center For Resources In Technology
1720 So. Amphlett Blvd., Suite 120
San Mateo, CA 94402
(415) 345-5700

THE MOST VALUABLE DISC
IN YOUR PROGRAM LIBRARY
EVEN PLAYS A LITTLE MUSIC—
IF YOU'LL ASK IT TO.



Introducing I.B.Magazette.

Our Magazine On Diskette
Increases The Value And Usefulness
Of Your IBM Personal Computer By Building Your Program Library.

I.B.Magazette is a new form of communication that is an exciting, entertaining way to build your program library, sharpen your skills, and have fun while expanding the usefulness of your PC.



Each issue contains detailed step-through tutorials, programs, utilities, hints, reader contributed material, even music and games. Always included is a major program or a demonstration version of commercially available soft-ware. This alone is worth far more than the subscription price.

Our bi-monthly diskette provides current hands-on experience. As a national user's group we are a regular, dependable means of program and information exchange.

The flippy-floppy diskette is sent to you by mail. Run it, read it, copy it, and enter your comments through your keyboard. Then return the original along with your check for the next issue in the provided postage-paid mailer.

I.B. Magazette is $15 for your initial issue. Subsequent issues are only $10 each with return of the diskette. Annual subscriptions (6 issues) are $80. To join, fill out the form below and send it to us with your check.

(IBM-PC-64K & ONE DRIVE REQUIRED)

Mark issues desired and send your check for total purchase (foreign: only Money Orders, U.S. funds):

I.B. Magazette
1306 Petroleum Tower
Shreveport, La. 71101

☐ CURRENT ISSUE _____ **$15**

☐ ANNUAL (6 issues) _____ **$80**

BACK ISSUES

☐ VOL. 1.1 First edition — games (TOOTER and HI-LO)•demo of VOLKSWRITER (word processor)•PHONE CHECK (long distance number verifier)•ARITHA (a math driller)•and more _____ **$15**

☐ VOL. 1.2 Part 1 interactive sort tutorial•an interactive demo of ≪ANSWER≫ (data base manager)•game: SIMON•game: CAPTURE•display utilities•music•diskette hints•and more _____ **$15**

☐ VOL. 1.3 Part 2 of the sort series•ALGEBRAIC GRAPHIC DISPLAY•QUIZMAKER•QUIZGIVER•MORE UTILITIES•A USA MAP•complete PC-FILE program•music: Auld Lang Syne _____ **$15**

☐ VOL. 2.1 Part 3 of the sort series•demo: D-Base II•GUMUPS (set of utility programs)•simulation game of LIFE•user contributed programs•song: Anitra's Dance•more _____ **$15**

☐ VOL. 2.2 Part 4 of sort series:Shellsort•demo:Stock Portfolio Reporter•BLACKJACK•Graphics demo•PC/PAD (Word processing spreadsheet)•utilities•music•hints•and more _____ **$15**

☐ VOL. 2.3 Part 5 of sort series:Disk Sorting Methods•HELP utility•START-UP utility•games•music•hints•tutorial on SEARCHING TECHNIQUES•statistical program•plus more _____ **$15**

NAME _____

ADDRESS _____

IBM IS A TRADEMARK OF INTERNATIONAL BUSINESS MACHINES CORPORATION

I.B.Magazette

1306 Petroleum Tower
Shreveport, LA 71101



301/937-4339
Beltsville, Maryland
Small People Software
SYSOP: Chet Rhodes
24 hrs, games, messages

312/259-8086
Chicago, Illinois
SYSOP: Gene Plantz
(PCMODEM)
24 hrs, download & upload, messages, 300/1200

312/376-7598
Chicago, Illinois
SYSOP: Pete Coniceak
24 hrs, download & upload, messages, 300

319/363-3314
Cedar Rapids, Iowa
SYSOP: Ben Blackstock
24 hrs, download & upload, messages, 300

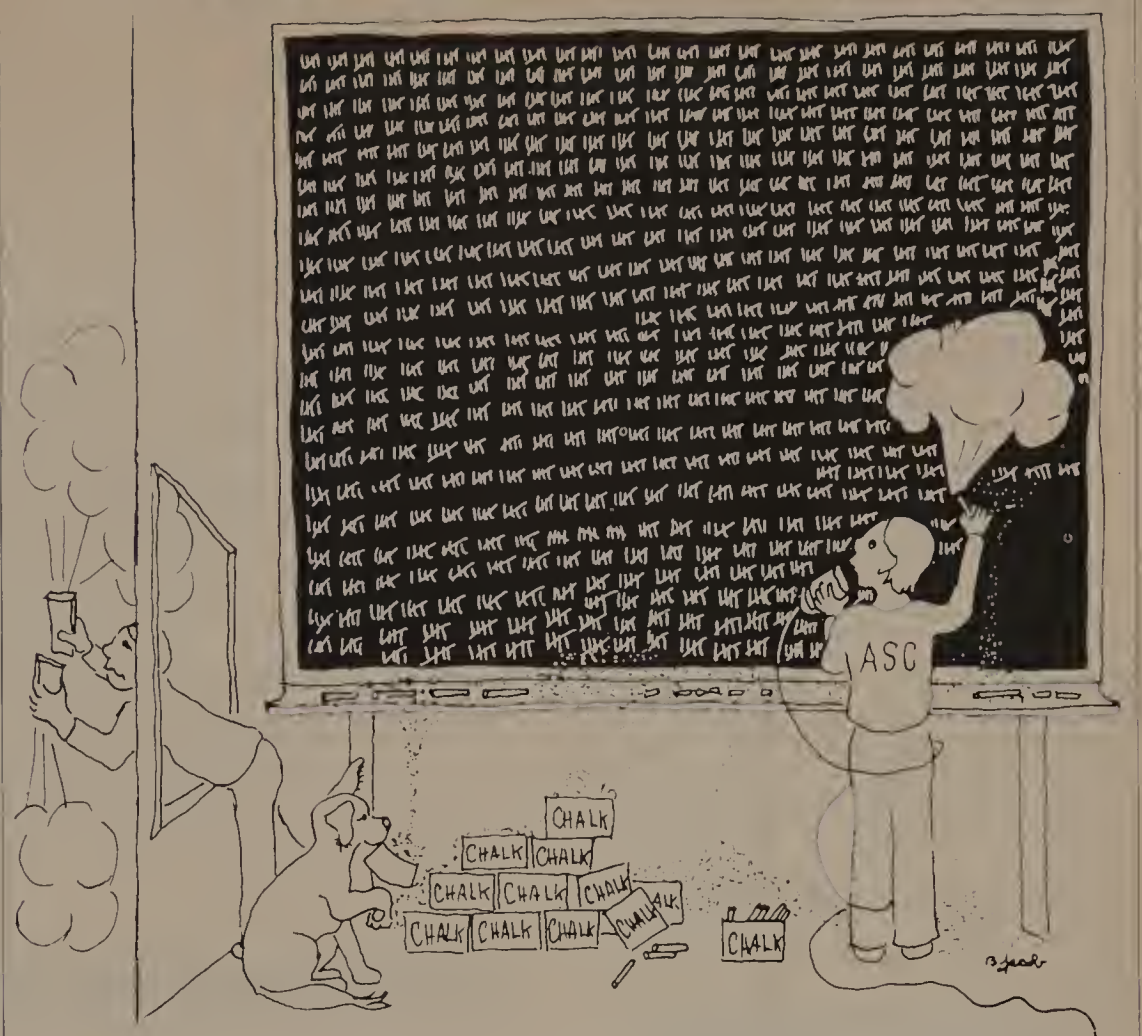
415/861-5733
San Francisco, California
SYSOP: Harry Logan
Hours variable, download & upload, messages, 300/1200

416/499-7023
Toronto, Canada
SYSOP: Doug Peel
24 hrs, download & upload, messages, 300/1200

608/262-4939
Madison, Wisconsin
PC Users Group
SYSOP: Read Gilgen
5 p.m. to 8 a.m. weekdays, 5 p.m. Fri to 8 a.m. Mon, download & upload, messages

(continues)

15K MEMBERS AND GROWING



American Software Club has been selling software for the APPLE, ATARI, IBM, TRS-80 and CP/M Computers (DEC, Eagle, Vector 4, Northstar, Xerox 820, Superbrain, Heath/Zenith, NEC, Televideo, Altos, Columbia, Osborne, Sanyo) since 1981. Computerists don't just *join* ASC—they *stay* with us.

Chalk it up to . . .
Having 600 products in stock and our "lowest price" guarantee.
Chalk it up to . . .
Our free bi-monthly Compendium magazine which gives comprehensive product descriptions, club news, and services.
Chalk it up to . . .
Our toll free technical support and order lines. ASC doesn't just *sell* software—we *support* it!
Chalk it up to . . .
Speedy shipping. Because we know waiting can be frustrating, ASC has been shipping more than 60% of orders in under 6 hours.

But don't just take our word for it. Join now, and take advantage of our *free* one year membership offer. With absolutely no purchase obligation, you have nothing to lose and everything to gain.

Wondering if there are strings attached? The only one is in the cartoon . . .



For a One-Year Trial Membership with no fee or obligation, fill out the coupon or call our Toll Free Number:

1-800-431-2061

(NY Residents call 914-762-5644)

American Software Club, Inc.
Millwood, New York 10546

Please begin my free one-year trial membership as outlined above

Name _____

Address _____

City/State/Zip _____

Outside the US Please enclose $15.00 (US) for a one year membership

My computer is:
- ☐ APPLE
- ☐ ATARI
- ☐ IBM PC
- ☐ TRS-80 (Mods 1, 2, 3, 4)
- ☐ CP/M (8" or 5¼")

Reader Service #359



EDUCATIONAL SOFTWARE

BASIC Instruction Course **$39.95**
Twelve self-paced modules covering BASIC and PC-DOS functions. Supplied on a two disk set.

Word Whiz **$29.95**
An educational game teaching rapid word recognition, spelling, and keyboard use.

Super Whiz **$29.95**
An esoteric, cerebral version, challenging high-school to college graduates.

The Wiz **$69.95**
A teacher customized instruction program..

States 'n Caps **$29.95**
A graphics-intensive game, teaching America's states 'n capitols.

BUSINESS SOFTWARE

Civil Engineering Pac **$89.95**
A compendium of solutions to common civil engineering problems.

Mailing List I **$39.95**
Exceptional features usually found only on programs costing 10 times as much.

Auto Dialer **$39.95**
An auto-dialing database for salesmen and executives.

Business Pac I **$29.95**
A wide assortment of programs designed to handle everyday business problems.

Micro Minder **$39.95**
A multi-purpose itinerary and appointment scheduler.

GENERAL INTEREST

Prosthesis **$29.95**
Adult adventure. X-RAYted fun.

Video Etch **$39.95**
A powerful graphics screen editor.

Game Pac I **$29.95**
Exciting ten-game anthology.

U.S. Motors **$29.95**
Automobile corp. simulation/adventure.

To order, or for more information, call toll-free:

1-800-321-5346

Our Guarantee: We unconditionally guarantee all our software or your money back (less $3.00 shipping) if returned within 15 days of receipt.

alphanetics software

P.O. Box 339, Forestville, CA 95436
24-hour phone: 1-707-887-7237

Reader Service #370

BBS Watch

703/560-7803
Vienna, Virginia
ABBS with IBM PC
Conference
24 hrs, download & upload, messages

703/680-5220
Dale City, Virginia
Dale City Info Exchange
SYSOP: Tim Mullins
24 hrs, news, new product review—all PCs

703/978-0921
Fairfax, Virginia
SYSOP: Bruce Churchill
(Hostcomm)
24 hrs, software eval/purchase
(Passwd = IBMPC)

703/978-9592
Fairfax, Virginia
SYSOP: Don Withrow
(Hostcomm)
24 hrs, download & upload, tips
(Passwd = IBMPC)

BBS of the Month

This issue's BBS of the Month is the Rockville, Maryland, Bulletin Board System, 301/949-8848. The following is a partial file transfer list; the bulletin board list may change as the SYSOP adds or deletes items. The listing includes the file size in bytes.

SORT.DOC	5888	SORT documentation
SORTEST.BAS	8064	SORT demonstration
SCROLLK.BAS	1711	SCROLLK.COM in BASIC
SCROLLK.ASM	11685	Use ScrollLock key for screen display and page advance
PHONE.TXT	5757	IBM PC BBS phone numbers
USERGRP.TXT	2499	IBM PC user groups USA
BBSEVAL.TXT	4736	Jordan's BBS evaluations
PROFILER.BAS	1920	PROFILER in BASIC
GRAFTRAX.DOC	2048	GRAFTRAC2 documentation
GRAFTRAX.HEX	2432	GRAFTRAC2.HEX (improved)
PECOLOR.ASM	11776	Personal Editor color modifications
WSMOD.HEX	19274	WordStar patches for printer support
WSMOD.DOC	4608	WSMOD.COM documentation
WSMOD.ASM	61312	WordStar patches in assembly
VISICOL.ASM	28800	VisiCalc patches for color display
GRAFTRK1.ASM	25216	PrtSc replacement for Epson printers
UNPROT.BAS	1792	Unprotect BASIC programs
DBASE2C1.HEX	17280	Color DBASE2.COM in hex
DBASE2C1.ASM	54656	Color DBASE2 in assembly

716/836-6964
Buffalo, New York
SYSOP: Bob Taylor
9 p.m. to 9 a.m. Tu, W, Th, F; 6 p.m. Sa to 9 a.m. Tu; download & upload, messages, 300

913/842-5749
Lawrence, Kansas
24 hrs, download & upload, messages

919/847-4625
Raleigh, North Carolina
SYSOP: Randy Ray
Download & upload, messages, 300/1200
(Passwd = IBMPC)

800/848-8199
CompuServe
24 hrs, download & upload, messages
Subscribers only

SQUISHER.BAS	4641	BASIC program squisher
CRAYON.FIX	768	PC-crayon circle fix test
UNWS.ASM	8576	UnWordStar in assembly
UNWS.BAS	768	UnWordStar in BASIC
CMD185.DOC	11760	DOS 1.85 documentation
BASICAID.BAS	39358	BASICAID compress programs
BASICAID.DOC	11904	BASICAID documentation
PECOL1.BAS	10752	Personal Editor with color in BASIC
FILEHIDE.BAS	12800	Hides files in BASIC
pe-mod2.txt	1664	Eliminates Personal Editor logo
ADVEN2.BAS	22528	Adventure #2 game
ADVEN2H1.BAS	384	Adventure #2 hint #1
ADVEN2H2.BAS	256	Adventure #2 hint #2
BOOKINV.BAS	6656	Book inventory system
PEMOD2.TXT	1664	Eliminates Personal Editor logo
ADVEN2.BAS	22528	Adventure #2 game
NECSCRN.BAS	5888	NECSCRN in BASIC
LOTUSRNG.001	6144	Lotus 1-2-3 list ranges
VISIC.UN	2688	Unprotect VisiCalc in DEBUG
VISICOM.TXT	2432	Make VisiCalc a .COM file
VDISK.ASM	9091	RAM disk for DOS 2.00 in assembly
VDISK.BAS	2773	RAM disk in BASIC
DMLQ.DOC	918	WordStar printer documentation
NECSCRN.DOC	2048	Print utilities for NEC 8023A printers
KEYS2.BAS	5120	Redefine keys with DOS 2.00

IT'S HERE.

The first computer magazine for PC users . . . entirely on disk!

MENTOR . . . the magazine on disk talks directly to your IBM PC, not about it. Features that augment popular programs . . . unique graphics . . . software news . . . helpful hints and new product demos are included in each exciting issue.

Published bi-monthly, MENTOR can be your passport to the wider world of the personal computer.

Charter subscriptions are now open. The premiere issue is ready now.



MENTOR™
. . . the magazine on disk
1362 Pacific Ave.
Santa Cruz, CA 95060
Toll Free 1-800-227-3900
In California 1-800-632-2122

OK!

☐ Enroll me as a charter subscriber 6 issues $99.
☐ Send me the first issue. Enclosed is $19.97
☐ Check or money order
☐ VISA ☐ MasterCard
No. _____
Exp. _____ Bank No. _____
Name _____
Company _____
Address _____
City _____
State/Zip _____
Signature _____
Note: Check here ☐ if you have single-sided drives.

Reader Service #232

We Offer You More!

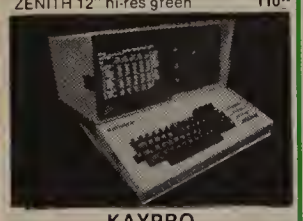


That's right. If you compare the benefits of ordering from National Computer to all our competitors, you'll see why more smart shoppers buy from us everyday. We save you money even before you order with our toll free 800 line, and then if you find a lower advertised price we'll meet it. Since we stock what we advertise you can rest assured your order will be shipped promptly. In addition, if for any reason you are not satisfied with any merchandise you purchase from National Computer you may return it for exactly what you want or a full refund. Check us out! We've been in business for over 4 years, and one glance at our catalog will demonstrate the commitment we have to direct marketing and to our fine customers.



VIDEO MONITORS

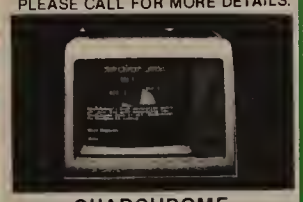
AMDEK 300 12" Hi-res green	145.00
AMDEK 300A 12" Amber	159.95
AMDEK Color I Plus 13" Color	329.95
AMDEK Color II hi-res RGB	439.95
AMDEK 310G Green	179.95
AMDEK 310A Amber	179.95
COMREX 5600 12" hi-res amber	169.95
NEC 1201M 12" Hi-res oreen	159.95
Princeton PGS HX-12	499.95
TAXAN Vision I 12" med-res RGB	329.95
TAXAN Vision 3 12" hi-res RGB	499.95
TAXAN 12" hi-res amber	149.95
ZENITH 12" hi-res green	110.95



KAYPRO

The anytime-anywhere computer. Includes CP/M, CBASIC, a spreadsheet and wordprocessing software.

PLEASE CALL FOR MORE DETAILS.



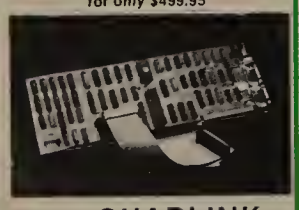
QUADCHROME BY QUADRAM

High Resolution 12" RGB color monitor.

- 80 character x 25 lines
- 690H x 240V dot resolution
- 16 colors, high & low intensity
- Includes IBM PC cable
- Very affordable

Only $529.95

We carry the Princeton PGS HX-12 for only $499.95

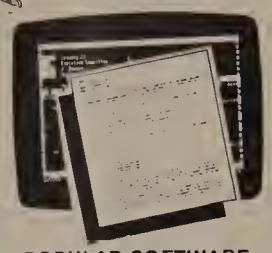


QUADLINK

by Ouadram

Only $499.95

Now you can run Apple software on your IBM PC. Advanced technology from the IBM PC peripheral leader. Ouadram has made it possible. Ouadlink allows using all IBM enhancements while running Apple software, including all peripherals. Now you can enjoy the best of both software worlds including hi-res games, special packages not available on the IBM PC. Apple-ize your IBM today!



POPULAR SOFTWARE

WordStar by MicroPro	269.95
Random House Thesaurus	129.95
MailMerge by MicroPro	169.95
SuperSort by MicroPro	169.95
SpellStar by MicroPro	169.95
dBase II/MS-DOS or CP/M86	429.95
LOTUS 1-2-3	Please calf for details
PC Tutor by Comprehensive	69.95
Home Accountant Plus	115.00
Crosstalk by MicroStuf	129.95
Peachtree GL/AR/AP 4 pak	399.95
SuperCalc by Sorcim	139.95
VolksWriter by Lifetree	139.95
Microsoft Multi-Plan	179.95
Microsoft Flight Simulator	39.95
VisiCalc	169.95
VisiFile	219.95
VisiTrend/Plot	219.95
VisiSchedule	219.95
VisiWord(req. 128K)	299.95



EAGLE COMPUTER

PLEASE CALL FOR DETAILS ON OUR EAGLE IIe AND EAGLE PC SYSTEMS



HAYES IBM PC MODEM

Only $449.95

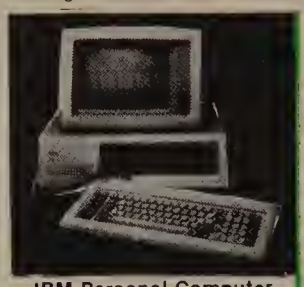
Smartmodem 1200B with communications software

A professional communication device made by HAYES, the leader in the micro-computer modem industry, it uses advanced state-of-the art technology. It plugs directly into the IBM PC and comes complete with many useful functions and features. In addition, Smartcom II is included, the software support package for automatic number dialing, dialing from the keyboard, storing and retrieving numbers, redial, manages file transfers, handles several log-on sequences, etc. The 1200B and software are completely compatible with IBM PC X/T

HAYES Smartmodem 300	219.95
HAYES Smartmodem 1200	489.95

COMPATIBLE MODEMS FOR IBM PC

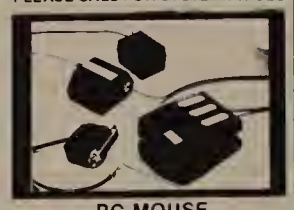
Cactus Technology Modem	299.95
Novation J-Cat 300	114.95
Anchor Mark VIII 300/1200	299.95
Rixon PC212A (IBM PC)	Calf
PC Modem Plus	349.95



IBM Personal Computer

Includes 64K, 2 DD/DS 320K drives, keyboard, color video card, & MS-DOS. Monochrome monitor by IBM is optional.

PLEASE CALL FOR SYSTEM PRICES.



PC MOUSE

For use with IBM, Radio Shack, Apple, etc. System includes Mouse Systems M-1 optical mouse w/pad & RS-232 interface.

Only $249.95

MICROSOFT MOUSE AVAILABLE PLEASE CALL FOR PRICE



BIG BLUE Z-80 CARD

Z-80 with 64K, parallel & serial I/O, hard disk interface & clock 459.95
BYAD DS1 Z-80 card with software 579.95



KOALA TOUCH TABLET

A new dimension in computer control-with the touch of a finger.

Special price 109.95



MISCELLANEOUS

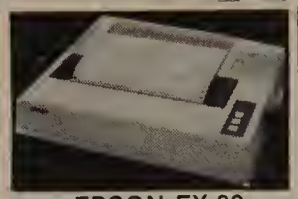
SYMTEC Light Pen	139.95
KRAFT Joystick	59.95
KRAFT Paddles	49.95
MicroControl Sys Space Tablet	479.95



SWEET-P PLOTTER

A simple to operate plotter which easily intefaces to the PC using a centronics parallel port. Complete with software, set of pens, paper and operators manual. List Price $795.00

Special Offer 529.95



EPSON FX-80

Call for special price

RX-80 Special Price $339.95

EPSON FX-100
GEMINI 10X
GEMINI 15
C.ITOH 8510
C.ITOH 1550
NEC 8023A
BROTHER HR-1
CANON A210 INK JET
TRANSTAR

Please call for our low prices



OKIDATA ML92

160 cps, 10" carriage, 80 columns

Only $499.95

Tractor for ML 92	59.95
OKIDATA 93	869.95
OKIDATA 82A with tractor	459.95
OKIDATA 84A par. w/tractor	999.95



TRANSTAR 315 COLOR PRINTER

Prints 7 colors plus more than 30 shades, all in a single pass of the print head. And it's built by Seiko.

Only $549.95



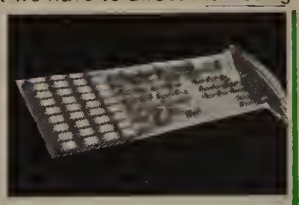
LETTER QUALITY PRINTERS

C. ITOH F-10 Starwriter 40 cps	1149.95
C. ITOH F-10 Starwriter 55 cps	1649.95
Daisywriter 40 cps w/48K buffer	1049.95
NEC 3510 33 cps RS-232 serial	1389.95
NEC 3530 33 cps parallel	1489.95



NEC 3550 Sprinwriter for IBM PC

Only $1889.95



QUADRAM QUADBOARD

256K only $399.95

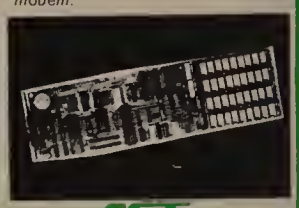
64K 269.95 128K 349.95 192K 419.95

512 QUADBOARD

64K 269.95 256K 429.95 512K 639.95

QuadChrome RGB Color Monitor Call

Coming soon! New direct connect modem.



AST MEGAPLUS

64K with serial & clock		339.95
128K 399.95	192K 449.95	256K 499.95
64K with parallel & serial		379.95
128K 439.95	192K 499.95	256K 549.95

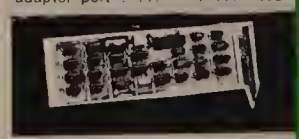
MegaPak option (256K) for 512K total 329.95

COMBOPLUS

64K with serial, parallel & clock 339.95
128K 399.95 192K 459.95 256K 499.95

I/O PLUS

Serial, parallel, clock and game adapter port 195.00



Apparat, Inc

ComboCard with parallel printer port, Asyncronous communications / RS-232 port, and clock/calendar 169.95
RS-232 cable for combo card . . 29.95



PLANTRONICS™ Frederick Electronics

Frederick COLORPLUS Hi-Res Color Graphics Card

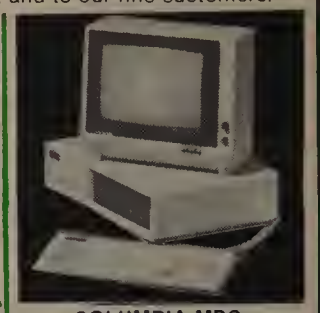
includes draftsman utility software

Only $369.95



DISK DRIVES FOR IBM PC

Tandon TM 100-2 DS/DD	249.95
Tandon 5¼" Half-Heights	CALL
Davong 5 mb	CALL
Davong 10 mb	CALL
Davong 15 mb	CALL



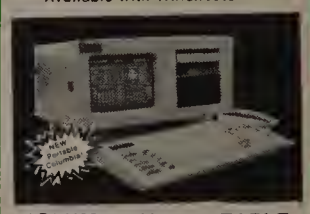
COLUMBIA MPC IBM PC compatible system

Includes 128K, two DS/DD 320K drives, 2 RS-232 serial ports, centronics parallel printer port, 8 IBM PC compatible expansion card slots, video monochrome/color/graphics card, and IBM type keyboard

Included with system is MS-DOS, CP/M 86, BASICA (w/color graphics, asychronous communications support, macro assembler) Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Columbia Tutor, diagnostics and HOT LINE support.

Please call for price.

Available with Winchester disk



COLUMBIA VP PORTABLE

Featuring IBM-PC and COMPAQ compatibility teamed with the most comprehensive software package in the industry to deliver all the functions you need. Includes 128K RAM, expandable to 256K, 2 5¼" half-high floppy disk drives with 320K DS/DD 9 green screen, 80x25" characters Full IBM compatible keyboard The unit only weighs 32 lbs.

PLEASE CALL FOR MORE DETAILS.



corona

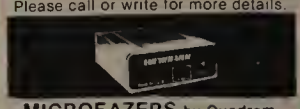
IBM PC COMPATIBLE DESKTOP COMPUTER

128K, dual 320K disk drives, 9" display, serial & parallel ports, and MS-DOS.

IBM PC COMPATIBLE PORTABLE

128K dual 320K disk drives, 9" display, serial & parallel ports, and MS-DOS.

Please call or write for more details.



MICROFAZERS by Quadram PRINT BUFFERS

Please call for prices on the configuration of your choice

DISKETTES

3M Scotch 5¼ DS/DD Box of 10	35.95
Verbatim Diskette 5¼ DS/DD Box of 10	38.95
Disk Drive Head Cleaning Kit for 5¼	27.95

Your Guarantee of Satisfaction

We guarantee every item in this advertisement for **30 days.** If, for any reason whatever, you are not satisfied with any merchandise purchased from us, we want you to return it to us at our expense. We will exchange it for exactly what you want, or will refund your money, and include any shipping charges you have paid.

NATIONAL COMPUTER PRODUCTS

To order please send money order or cashier's check Personal checks 3 weeks to clear Prices reflect 2% cash discount We accept VISA, MasterCard, American Express, Diners Club and Carte Blanche. Shipping, handling & insurance charges add 3% of merchandise total (min $5.00) California residents add 6% sales tax Foreign customers please call or write Prices and availability subject to change without notice All equipment is new and warranted by the manufacturer

It's Here!



National Computers Fall 1983 collection of State-of-the-art computer merchandise is available now. You'll find dozens of products, including computers, printers, video monitors, modems and accessories for IBM PC, APPLE IIe and many other computer systems, all at the great prices you expect from us. It includes dozens of illustations and informative descriptions. For your copy send $1.00, which we will credit to your next order.

TOLL FREE ORDERING **800 - 854-6654**

VISA

NATIONAL COMPUTER PRODUCTS

8338 Center Drive, La Mesa, CA 92041-3791 AD#PCW1083

master charge THE INTERBANK CARD

Information on products, and order inquiries call (619) 460-6502 **Calif., Alaska, & Hawaii Call (619) 698-8088**

DEALERS, WE BUY EXCESS STOCK, PLEASE CALL OR WRITE

Reader Service #351

User Group Dispatch

Running a software exchange

James B. Cookinham

Most user groups manage a software exchange for their members, and International PC Owners, Inc. (IPCO) is no exception. The club's software exchange has been evaluated by members as the most popular service the group offers. The exchange includes approximately 200 programs that have been written by members or translated from other systems. The programs vary in complexity from a 1500-byte mini word processing program to a 30,000-byte statistical regression analysis program.

Even though the exchange programs were written by amateur programmers, they often perform—without any need for modification and at a fraction of the cost—the same functions as commercially available programs.

IPCO first announced its intention to start a software exchange in the December 1981 *IPCO Info*, the group's newsletter. At that time public domain software was not readily available for the IBM PC, so program donations were slow in coming. Many of the group's first public domain programs were translated from other systems.

Although members are willing to donate their programs free of charge, IPCO offers four programs of the author's choice in exchange for each program donated. Programs normally cost members $3 each.

The Software Library

Once programs are donated they must be organized into the software library. The system of organization should give members easy access to the exchange and make distributing the programs easy for the librarian. We have sorted our programs into seven sequentially numbered categories as follows:

1000	Business and professional
2000	Games
3000	Math and engineering
4000	Graphics and demos
5000	Educational
6000	Home applications
7000	Miscellaneous

The programs are stored by category, each category on a separate disk. For example, program 5010, Capitals of North America, is the tenth program in the 5000, or educational, category. Letters are assigned to programs to identify revisions.

The club's software exchange has been evaluated by members as the most popular service the group offers.

Program 2008-B would indicate a revision of 2008-A. File name extensions identify file type. The extensions we use most commonly are shown in Table 1.

Occasionally we receive a program that contains a number of individual files. These programs are identified with the usual number, and each file is identified with an additional name. For example, 2023-A.BAS LUNAR LANDER refers to the Lunar Lander file in game 23. When the program directory is displayed on the monitor, it reads 'LANDER.XXX', with three distinct extenders rather than the assigned IPCO number. We do not renumber all the files in such an involved program to conform to our numbering system for fear that we will make the program unusable.

Distribution

We publish a software exchange catalog every other month in *IPCO Info*. Members can order individual programs from the catalog; consequently, each order must be filled out according to the member's individual request. Since one order may include many programs, each loaded from a different disk, our method is time consuming. But we decided to use it so that members would get only the programs they wanted, rather than a disk full of programs of which they wanted only one or two.

Most user groups have found an easier way to distribute programs. They provide members with disks of programs in the same category. The programs on each disk are chosen by the club librarian or by committee and are recorded on disk. Disk 1, for example, might contain ten games, disk 2 might contain ten educational programs, and disk 3 might contain ten math programs. The librarian can copy a large quantity of disks at one time and store them for later use. When a member places an order, the librarian simply pulls out the right disk and mails it.

Quality Assurance

Before programs are distributed to members, the librarian must make sure that they are free of bugs and are member written, not pirated. Making sure that the programs are bug free is a time-consuming process. Each program we receive is loaded, run, and checked for bugs and ease of use. We reject programs that are not self-explanatory because we assume that software exchange programs will be used by novices. A simple problem can easily become an insurmountable

DIAMOND DELIVERS!

FREE Dust Cover With Every Order

Multitool Word $269
Wordstar $249
dBase II/Quickcode $589
NEW—Wordstar/Mailmerge/Spellstar/Star Index $389.

Infostar $259
dBase II $call
Supercalc 2 $169

	LIST	OUR PRICE
Micropro®		
MAILMERGE	$250	$135
SPELLSTAR	$250	$135
WORDSTAR/MAILMERGE	$645	$339
INFOSTAR	$495	$275
CALCSTAR	$145	$ 89
Sorcim®		
SUPERCALC	$195	$129
SUPERCALC 2	$295	$169
SUPERWRITER	$295	$179
Visicorp®		
VISIWORD	$375	$279
VISICALC	$250	$169
VISIFILE	$300	$219
VISITREND/PLOT	$300	$219
VISISCHEDULE	$300	$219
Information Unlimited®		
EASYWRITER II	$350	$199
EASYSPELLER II	$225	$129
EASYFILER	$400	$249
Financier®		
PERSONAL SERIES	$195	$135
TAX SERIES	$150	$115
Lifetree®		
VOLKSWRITER	$195	$129
Lexisoft®		
SPELLBINDER	$495	$255
Microsoft®		
MULTITOOL WORD W/MOUSE	$495	$345
MULTITOOL FINANCIAL	$100	$ 69
MULTITOOL BUDGET	$150	$109
MULTIPLAN	$275	$179
PASCAL	$350	$259
FORTRAN	$350	$259
C COMPILER	$500	$349

	LIST	OUR PRICE
Ashton-Tate®		
dBASE-II	$700	$call
FRIDAY	$295	$209
Condor®		
CONDOR 20-3	$650	$429
Softword Systems®		
MULTIMATE	$495	$335
Alpha Software®		
APPLE—IBM CONNECTION	$195	$129
THE EXECUTIVE PACKAGE	$145	$109
DATA BASE MANAGER II	$295	$199
Fox & Geller®		
QUICKCODE	$295	$199
dGRAPH	$295	$ 65
dUTL	$ 99	
Supersoft®		
FORTRAN	$425	$329
C COMPILER	$500	$359
PERSONAL DATA BASE	$125	$ 99
Digital Research®		
PASCAL MT+ 86	$400	$295
CONCURRENT CP/M 86	$350	$259
C BASIC 86	$200	$145
PERSONAL BASIC	$150	$109
Continental®		
HOME ACCOUNTANT	$150	$ 99
Perfect Software®		
PERFECT WRITER	$495	$199
Quadram®		
QUADLINK	$680	$499
QUADCOLOR	$295	$229
64K EXPANDABLE BOARD	$395	$289
256K	$595	$425
Software Arts®		
TK SOLVER	$299	$225
FINANCIAL MGMT PACK	$100	$ 85

At Diamond Software we offer the best selling business application software for your **IBM PC** at the **lowest possible prices**. And we maintain a **complete technical department** to assist you before, during, and after your system purchase. Not only that, we offer **same day shipment** on most items and we accept Visa, Mastercard and also American Express. We'll even pay the shipping charges if you send us a money order, cashiers, company or personal check. Purchase orders are gladly accepted from qualified organizations and we welcome dealer inquiries. Call Diamond today, you'll be glad you did.

TO ORDER CALL TOLL-FREE 1-800-227-0545

For price quotes, information, or in California call 1-415-893-7676. We credit your order for the call.
Technical Department (415) 893-7678. International Telex 338139 (attn. 149)

Diamond Software Supply 484 Lake Park Ave., Suite 123 • Oakland, CA 94610

Software Specialists For The IBM PC

Shipping/Handling UPS surface $3.00 plus an additional $3.00 per item for UPS Blue. C.O.D. orders add $4.00. For personal check allow 2 weeks for delivery. All items subject to availability, prices subject to change without notice. Calif. residents please add 6½% sales tax *IBM is a registered trademark of International Business Machines. CP/M is a registered trademark of Digital Research

obstacle for a novice, and if an elementary level of explanation is not provided, the software exchange is deluged with calls from people who can't get the programs to run.

We found, for example, that a number of novices were using the lowercase *y* or *n* in answer to the 'Do you want instructions?' prompt. If uppercase letters are not used, the program will not continue or the instructions will be ignored. With each disk we distribute we provide a detailed handout that explains how to load a BASIC program and make it run.

We do not accept programs submitted on paper because we have found that entering them is time consuming and introduces an unacceptable number of mistakes, resulting in the need for lengthy debugging.

Extension	File Type
.ASM	Assembler source code
.BAS	Program in BASIC
.BAT	Batch file
.COM	IBM COM program
.EXE	IBM EXE program
.DOC	Documentation
.PAS	Pascal source code
.DAT	Program data
.TXT	Text

Table 1: File name extensions

We try not to modify or renumber the programs sent to us by our members. Renumbering a program can lead to problems: some of the remarks may refer to an invalid line number, or authors may send a letter discussing the contents of a certain line that can no longer be identified.

IPCO offers four programs of the author's choice in exchange for each program donated.

The only time that we find renumbering a program necessary is when we need room for the IPCO logo. Though we request that members start their programs on line 1000, this request is occasionally overlooked. Once a program is renumbered, making sure that the line numbers are consistent throughout the program is important.

We encourage our members to provide good documentation. Some programs are accompanied by a separate file that explains how to use the program, but most commonly the documentation is in the program itself. Some programs require the user to list the program and read the comments to understand how to use it.

We do not accept protected programs for our exchange. Members must be able to list a BASIC program, because one of the main functions of the exchange is to let members see how a program was written. Since programs can be listed, they can easily be modified. Members have found that changing programs and watching the effect of such changes is a good way to learn about programming.

Software Piracy

User groups should be sensitive to the possibility of piracy. Some members of the microcomputer community do not support user groups because of the software piracy that has occurred too often in the computer field. We warn our members who contribute programs that the programs must be their own work. We review every program for possible copyright statements, and if we find clues pointing to impropriety, we destroy the program.

User-Supported Software

IPCO's software exchange includes user-supported programs. User-supported software authors are professional programmers who avoid heavy marketing costs by distributing their programs free, requesting only that those who receive them and find them useful make a contribution. IPCO now has eight user-supported programs, including a communications program, a data base manager, an assembler, a spreadsheet, and a graphics dump program.

User-supported software has been popular with our members; we have sent out hundreds of the most popular programs. The program authors, however, are not as delighted. We have been in contact with quite a few of these authors and have been told that user group member contributions have been almost nonexistent.

User Group Dispatch

We take every opportunity to encourage those who find user-supported programs useful to send the authors a contribution.

IPCO's software exchange is the most popular aspect of our user group. Our members encourage us to continue this service. Although distributing member-written programs takes time, it is satisfying. Contributors are proud of their efforts, which in some cases spanned several months.

If you have the opportunity to be in charge of a software exchange for your group, accept the challenge but commit to a fixed term. Be prepared to spend time. Organization is the key to a smoothly operating exchange.

James Cookinham is president of International PC Owners.

User Group Directory

PC World publishes a User Group Directory every month. If your group is not in this list but would like to be, send the group's name, address, contact, and other information to *User Group Dispatch, PC World,* 555 De Haro St., San Francisco, CA 94107.

Alabama
Birmingham User Group
Chet Ellis
ComputerLand, 215 W. Valley Ave.
Birmingham, AL 35209
205/942-8085

Arizona
IBM PC User Group
Theresa Baudier
P.O. Box 1489
Tucson, AZ 85702
602/293-0611

Phoenix IBM-PC Users Group
James S. Serbin
P.O. Box 44218
Phoenix, AZ 85064
602/954-7519

California
Diablo Valley PC
Al Hunt
1415 Oakland Blvd. #101
Walnut Creek, CA 94596
415/687-8037

Greater South Bay IBM-PC Users Group
Mike Immel
P.O. Box 665
Lomita, CA 90717
213/325-7533

IBM PC Users Group of Santa Maria
Ray Smyer
575 Ferndale Dr.
Santa Maria, CA 93455
805/937-7490

IBM Users Group of California
Neil Zachary
P.O. Box 4136
Los Angeles, CA 90028
213/937-1314

Marin-Sonoma PC Users
William O. Ward
P.O. Box 2909
San Francisco, CA 94126

Modesto-Turlock IBM PC User Club
Sy Guth
P.O. Box 5103
Modesto, CA 95352
209/577-3416

North Orange County IBM Club
Glenn A. Emigh
1533 Sherwood Village Circle
Placentia, CA 92670
714/996-4464

Rancho California Computer Club
Joe Dorner
P.O. Box 651
Temecula, CA 92390
714/676-5856

Sacramento IBM-PC Users Group
David T. Burhans, Jr.
8122 Holm Oak Way
Citrus Heights, CA 95610
916/723-9745

San Diego Computer Society
Tom Field
1384 Caliente Loop
Chula Vista, CA 92010
619/421-9686

San Fernando IBM PC Users Club
David Nussbaum
11558 Riverside Dr. #207
North Hollywood, CA 91602
213/985-8337

San Francisco IBM PC Users Group
4411 Geary Blvd. #33
San Francisco, CA 94118

San Francisco PC Club
Max Brioski
1045 Balboa St.
San Francisco, CA 94118
415/386-5176

(continues)

Win the paper chase!



Be a winner with MBA...the smart software for business

Winning in today's fast-paced business world means keeping ahead of the paperwork — the endless flow of invoices, pay checks, purchase orders, bills and payments that can bog down even the best run business. The right accounting software system can put you out front to stay — and that's just what MBA software is designed to do!

MBA is the only full-line accounting software with complete financial applications AND interfaces to the most popular database, spreadsheet and word processing packages.

MBA systems are designed to operate independently or in combination with one another. The MBA accounts receivable, accounts payable, payroll, inventory, purchase order and time accounting systems are fully integrated with the MBA general ledger accounting system through a common database. Data entered into one system transfers into all other applicable systems.

What's more, our exclusive full-screen data entry and review lets you call up full pages of information on one screen quickly, and edit and validate vital data on-line, instantly.

MBA applications are available for most 8-bit and 16-bit computers using CP/M*, MP/M*, CP/M-86*, MP/M-86*, Concurrent CP/M-86*, PC-DOS†, MS-DOS‡, MPX★, and Turbo DOS#. We also offer a toll-free 800 support line for questions and assistance.

Win the paper chase with MBA software — available at most computer and business software stores.



"THE SMART SOFTWARE FOR BUSINESS" ™

MICRO BUSINESS APPLICATIONS™

12281 NICOLLET AVE. SO.
BURNSVILLE, MN 55337
MN. 612/894-3470
TX. 713/358-6954
TELEX 499-3231

*Trademarks of Digital Research, Inc. †Trademark of International Business Machines
‡Trademark of Microsoft ★Micro Business Applications #Software 2000

Reader Service #279

MICROMAIL™



IBM PC-COMPLETE SYSTEM—SPECIAL PRICE

PC System includes 64K IBM PC with 320 KB Floppy Disk Drive, Controller, Color Graphics Card, Monitor **$2490**

DISK DRIVES FOR IBM PC

Tandon 100-2 ..... **$240**
Shugart 455-2 ..... **$245**
Teac 55-B **$255**

MONITORS

NEC, DYNAX AMDEK ..... **CALL**

PRINCETON GRAPHICS SYSTEMS

Hi-Res Color **$490**

PRINTERS

C-ITOH

GX-100 ..... **$240**
8510 ..... **$460**
F-10 ..... **$1690**
1550 ..... **$690**
F-10 ..... **$1290**

OKIDATA

82A **$440**
83A **$690**
93A **$970**
84A **$975**
92A **$575**

BROTHER

HR-1 ..... **$750**
HR-15 ..... **$570**

SMITH CORONA

TP-1 ..... **$520**

STAR MICRONICS

Gemini 10 ..... **$370**
Gemini 15 ..... **$540**

NEC

SPINWRITER

7710-1 ..... **$1950**
7715-1 ..... **$2100**
7720-1 ..... **$2400**
7725-1 ..... **$2400**
7730-1 ..... **$1950**
3510 ..... **$1350**
3515 ..... **$1350**
3530 ..... **$1550**
3550 ..... **$1850**
PC8023A **$450**

HARD DISKS FOR APPLE AND IBM

DAVONG

5 MB **$1450**
10 MB **$1650**
15 MB **$2250**

MEMORY BOARDS

TAVA CORP.

TRUMPCARD 1

256K Ram **$350**

TRUMPCARD 2

512K RAM **$550**

AST

IO Plus. Five function Card **$199**
Combo Plus 4 function card. Fully pop. 256K **$490**
Mega Plus. Fully pop. 512K **$990**

QUADRAM

Quad Card. Fully pop. 256K **$500**

BIG BLUE **$470**

HERCULES *Graphics Card* **$490**

MAYNARD SANDSTAR SERIES

FDC 5 1/4 & 8" **$220**
Multifunction Card **$90**
Memory Card **$180**
Ad-On Memory Module **$90**
Parallel Port Module **$70**
Serial Port Module **$90**
Clock Calendar Module **$70**
Game Adapter Module **$50**

DEC RAINBOW 100

Complete system 64K PC, Keyboard, Two Floppy Drives DS/DD, Monochrome Monitor **$2990**

APPLE II+

Compatible Computer with 48K Disk Drive, Controller, and Monitor **$990**

DISK DRIVE FOR APPLE

Slimline, or Standard **$250**

PERSONAL ACCOUNTANT *Software for your Apple IIe and Apple II+.* **$190**

APPLE IIe

Computer System, Controller, Two Disk Drives, Monitor **$1890**

MICROMAIL

631 E. First St., Tustin, CA 92680

PRICES AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE

(714) 838-9100

APPLE is a trademark of Apple Computers, Inc
IBM is a trademark of IBM Corp.

Reader Service #237

Santa Barbara City College Computer Science Department
Stu Swartz
721 Cliff Dr.
Santa Barbara, CA 93109
805/966-2919

Silicon Valley Computer Society
Elvin Bollet
P.O. Box 60506
Sunnyvale, CA 94088
408/243-1154

UC SF User Group
Bruce Stegner
UCSF Computer Center #U76
533 Parnassus
San Francisco, CA 94143
415/666-1409

Colorado
Denver User Group
Steve Leibson
4040 Greenbriar Blvd.
Boulder, CO 80303
303/494-4062

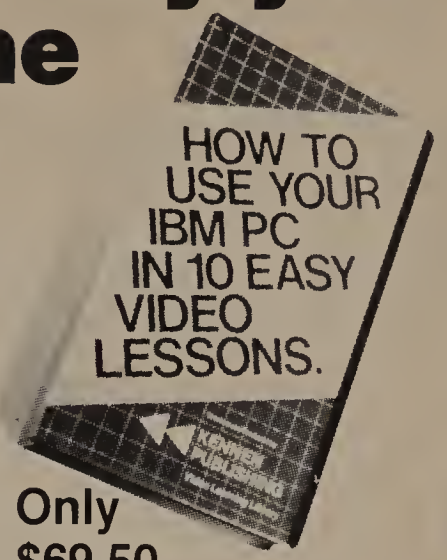
Northern Colorado PC Users
Steve Livingston
2601 Davidson Dr. #C-8
Fort Collins, CO 80526
303/223-8391

Connecticut
Central Connecticut User Group
Rich Paterson
ComputerLand, 131 S. Main
West Hartford, CT 06107
203/561-1446

IBM PC User Club of Stamford
Dave Foulger
69 River St.
New Canaan, CT 06840
203/966-9378

(continues)

The easiest way yet to master the IBM PC.™



More than 80 hands-on exercises right away with full color videocassette one-on-one tutoring.

Imagine . . . in less than four hours, you or your staff can be totally comfortable with that new IBM PC . . . formatting and disk copying, starting DOS, doing all the things that have taken others days, even weeks, to learn from written manuals.

Only $69.50

And in the comfort of your home or business. No time consuming classes to attend, no large seminars . . . just simple, high quality, one-on-one instruction.

The very same instruction that major corporations are discovering is the **easiest way yet** for people to quickly use that new computer productively.

Ask your local computer or video dealer, or call right now, 1-800-428-7777 for Mastercard or Visa orders (in Calif. call 415-332-5828 collect).

Versions available for the IBM PC, Apple II+, Apple III.

Send $69.50 + $3.50 for shipping and handling to:
Kennen Publishing Dept. PC5
150 Shoreline Hwy., Bldg. E
Mill Valley, CA 94941

KENNEN PUBLISHING

Please specify Beta II or VHS, Visa or Mastercard number and expiration date. Calif. residents add 6% sales tax.

The word Apple is a registered trademark of Apple Computer, Inc. IBM PC is a registered trademark of International Business Machines Corp.

Dealer Inquiries welcome – 1982, 1983 Kennen Publishing

Reader Service #88

Don't wait till it's too late to insure your computer

Now you can insure your computer against theft, fire, accidental damage, earthquake, even damage from power surges.

For as little as $35/yr. SAFEWARE™ covers all hardware, media and purchased software for full replacement after a low $50 deductible.

To obtain immediate coverage or more information, call toll-free today.
(In Ohio call 1-800-848-2112)

1-800-848-3469



SAFEWARE™

COLUMBIA NATIONAL GENERAL AGENCY
88 E. Broad St., Columbus, OH 43215

wabash®
diskettes for as low as $1.29 each!

Now get Wabash Quality at a CE Price

For over 17 years, Wabash has been making high quality and dependable computer products. Wabash diskettes are made to provide error-free performance on your computer system because every diskette has been totally and hypercritically tested. Since you can now buy Wabash computer products directly from CE, the world's largest distributor of magnetic media, you can now get maximum savings on every order. You can even order toll-free.

New Wabash Six Year Warranty

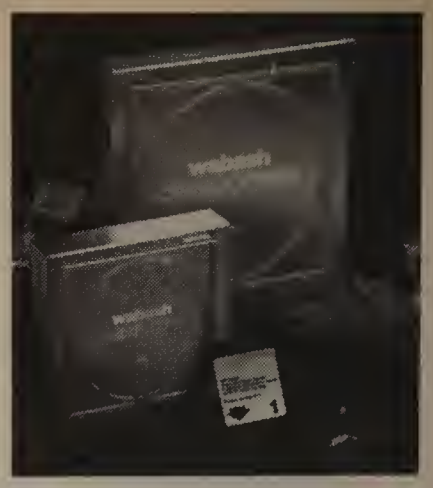
The quality of Wabash diskettes is stressed throughout the entire manufacturing process. After coating, all Wabash diskettes go through a unique burnishing process that gives each diskette a mirror-smooth appearance. Wabash then carefully applies a lubricant that is specially formulated to increase diskette life. Then, to keep out foreign particles, a unique heat seal bonds the jacket and liner together to help prevent contamination. After 100% hypercritical testing and certification, Wabash then packages each diskette, (except bulk pack) in a super strong and tear resistant Tyvek® evelope. The final Wabash product is then shrink-wrapped to insure cleanliness and reduce contamination during shipment. Wabash diskettes are so very reliable that Wabash now offers a six year warranty in case of defects in materials or workmanship on all diskettes purchased directly from Communications Electronics.

New...Wabash Diskette Duplication Services

Communications Electronics has teamed up with Wabash to provide a single-source solution for the diskette duplication requirements of software developers, OEM's and distributors. All service is in-house, to give you fast, dependable service. In most cases, delivery can be completed in five days. Whether you require 100, 1,000, or 10,000 copies per week, call CE first for a no obligation price quote. For additional information, please write us on your letterhead with your requirements.

SAVE ON WABASH DISKETTES Product Description	Part #	CE quant. 100 price per disk ($)
8" SSSD IBM Compatible (128 B/S, 26 Sectors)	F111	1.89
8" SSSD Shugart Compatible, 32 Hard Sector	F31A	1.89
8" SSDD IBM Compatible (128 B/S, 26 Sectors)	F131	2.39
8" DSDD Soft Sector (Unformatted)	F14A	2.99
8" DSDD Soft Sector (256 B/S, 26 Sectors)	F144	2.99
8" DSDD Soft Sector (512 B/S, 15 Sectors)	F145	2.99
8" DSDD Soft Sector (1024 B/S, 8 Sectors)	F147	2.99
5¼" SSSD Soft Sector w/Hub Ring	M11A	1.49
5¼" Same as above, but bulk pack w/o envelope	M11AB	1.29
5¼" SSSD 10 Hard Sector w/Hub Ring	M41A	1.49
5¼" SSSD 16 Hard Sector w/Hub Ring	M51A	1.49
5¼" SSDD Soft Sector w/Hub Ring	M13A	1.79
5¼" Same as above, but bulk pack w/o envelope	M13AB	1.59
5¼" SSDD 10 Hard Sector w/Hub Ring	M43A	1.79
5¼" SSDD 16 Hard Sector w/Hub Ring	M53A	1.79
5¼" DSDD Soft Sector w/Hub Ring	M14A	2.69
5¼" Same as above, but bulk pack w/o envelope	M14AB	2.49
5¼" DSDD 10 Hard Sector w/Hub Ring	M44A	2.69
5¼" DSDD 16 Hard Sector w/Hub Ring	M54A	2.69
5¼" SSQD Soft Sector w/Hub Ring (96 TPI)	M15A	2.59
5¼" DSQD Soft Sector w/Hub Ring (96 TPI)	M16A	3.69
5¼" Tyvek Diskette Envelopes - Price per 100 Pack	TE5	12.00

SSSD = Single Sided Single Density; SSDD = Single Sided Double Density; DSDD = Double Sided Double Density; SSQD = Single Sided Quad Density; DSQD = Double Sided Quad Density; TPI = Tracks per inch.



Quantity Discounts Available
Wabash diskettes are packed 10 disks to a carton and 10 cartons to a case. The economy bulk pack is packaged 100 disks to a case without envelopes or labels. Please order only in increments of 100 units for quantity 100 pricing. With the exception of bulk pack, we are also willing to accommodate your smaller orders. Quantities less than 100 units are available in increments of 10 units at a 20% surcharge above our 100 unit price. **Quantity discounts** are also available. Order 500 or more disks at the same time and deduct 1%; 1,000 or more saves you 2%; 2,000 or more saves 3%; 5,000 or more saves 4%; 10,000 or more saves 5%; 25,000 or more saves 6%; 50,000 or more saves 7%, 100,000 or more saves 8%, 500,000 or more saves 9% and 1,000,000 or more disks earns you a 10% discount off our super low quantity 100 price. Almost all Wabash diskettes are immediately available from CE. Our efficient warehouse facilities are equipped to help us get you the quality product you need, when you need it. If you need further assistance to find the flexible disk that's right for you, call the Wabash compatibility hotline. Dial toll-free 800-323-9868 and ask for your compatibility representative. In Illinois or outside the U.S. dial 312-593-6363 between 9 AM to 4 PM Central time.

Buy Wabash Diskettes with Confidence
To get the fastest delivery from CE of your Wabash computer products, we recommend you phone your order directly to our Computer Products Division and charge it to your credit card. Be sure to calculate your price using the CE prices in this ad. Written purchase orders are accepted from approved government agencies and most well rated firms at a 30% surcharge for net 30 billing. For maximum savings, your order should be prepaid. All sales are subject to availability, acceptance and verification. All sales are final. All prices are in U.S. dollars. Prices, terms and specifications are subject to change without notice. Out of stock items will be be placed on backorder automatically unless CE is instructed differently. Minimum *prepaid* order is $50.00. Minimum *purchase order* $200.00. All shipments are F.O.B. Ann Arbor, Michigan U.S.A. No COD's please. Non-certified and foreign checks require bank clearance.

For **shipping charges** add $8.00 per case or partial case of 100 8-inch flexible disks or $6.00 per case or partial case of 100 5¼-inch mini-diskettes for U.P.S. ground shipping and handling in the continental U.S.A.

Mail orders to: Communications Electronics, Box 1002, Ann Arbor, Michigan 48106 U.S.A. If you have a Visa or Master Card, you may call and place a credit card order. Order toll-free in the U.S. Dial 800-521-4414. In Canada, order toll-free by calling 800-265-4828. If you are outside the U.S. or in Michigan dial 313-994-4444. Telex anytime 810-223-2422. Order your Wabash diskettes today.

Copyright ©1983 Communications Electronics™ Ad #U12483

MasterCard VISA MEMBER DIRECT MAIL MARKETING ASSOCIATION Integrity

Order Toll-Free!
800-521-4414
In Michigan 313-994-4444

wabash error-free diskettes

COMMUNICATIONS ELECTRONICS™
Reader Service #372

Computer Products Division

818 Phoenix ☐ Box 1002 ☐ Ann Arbor, Michigan 48106 U.S.A.
Order TOLL-FREE 800-521-4414 or outside U.S.A. 313-994-4444

User Group Dispatch

Southeastern Connecticut IBM PC Users Group
Pat Ryan
78 Spring Glen Rd.
Niantic, CT 06357
203/739-4855

Delaware
PC Professional Users Group
P.O. Box 2350
Wilmington, DE 19899

District of Columbia
Capital PC
Janet Withrow
P.O. Box 3189
Gaithersburg, MD 20878
703/978-1530

IBM PC Special Interest Group (CompuServe)
Mike Todd
4910 43rd St. NW
Washington, DC 20016
202/364-2467
CompuServe: Mike Todd, 70001,1264; Wes Meier, 70215,1017

Florida
Manasota IBM PC User's Group
Richard Reynolds
1102 Mallorca Dr.
Bradenton, FL 33529
813/792-5400

Northern Florida Amateur Computer Club
Stephen D. LeBar
10921 Kuralei Dr.
Jacksonville, FL 32216

Hawaii
Hawaii IBM PC User Group
Doug Long
P.O. Box 22967
Honolulu, HI 96822
808/735-5769

Idaho
Idaho PC User Group
Bruce Burns
ComputerLand, 687 S. Capitol Blvd.
Boise, ID 83702
208/344-5545

Illinois
Association of PC Users
Glenn Yunashko
4727 S. Lavergne St.
Chicago, IL 60638
312/284-5872

Northern Illinois IBM PC Users Group
James L. Szafranski
5195 Castaway Ln.
Barrington, IL 60010
312/934-8133

Indiana
ComputerLand User Group
Susan Shields
ComputerLand
5450 N. Coldwater Rd.
Fort Wayne, IN 46825
219/483-8107

Indianapolis IBM User Group
David Reed
6704 Hoover Rd.
Indianapolis, IN 46260
317/259-7892

NEI User Group
George Gynn
9904 Goshen Rd.
Fort Wayne, IN 46818
219/693-3147

Northern Indiana IBM PC User Group
Dr. Terry Alley
316 N. Ironwood Dr.
South Bend, IN 46615
219/289-5506

Iowa
Cedar Falls User Group
Lee Ann Moore
Black Hawk Village Shopping Center
Cedar Falls, IA 50613
319/277-1700

IBM PC User Group
Gary Wilcox
P.O. Box 246
Des Moines, IA 50301
515/967-5880

Kansas
Kansas City IBM Users
R. Wayne Thompson
11005 W. 60th St.
Shawnee, KS 66203
913/268-7500

Topeka Library User Group
Becky Hinton
Topeka Public Library
1515 W. 10th St.
Topeka, KS 66604
913/233-2040

Wichita IBM PC Users Group
Jack Leonard
P.O. Box 18422
Wichita, KS 67218
316/681-9698, 788-3655

Kentucky
Bluegrass IBM PC Users Group
Diane Skoll
Computing Center
Room 72, McVey Hall
University of Kentucky
Lexington, KY 40506-0045
606/257-2900

(continues)

User Group Dispatch

Louisiana
Cajun PC Users
Sharon Denais
Oil Center Research, Inc.
P.O. Box 51871
Lafayette, LA 70505
318/232-2496

New Orleans PC Club
Walt Meyers
3517 19th St.
Mettarie, LA 70002
504/737-6318

NW Louisiana IBM PC User Group
William Dwinnell
1144 Hallmark Dr.
Shreveport, LA 71118
318/686-7781

Maryland
Baltimore PC
1910 Trout Farm Rd.
Jarrettsville, MD 21084

Massachusetts
IBM PC User Group
Boston Computer Society
Three Center Plaza
Boston, MA 02108
617/367-8080

Miller Microcomputer Services
61 Lakeshore Rd.
Natick, MA 01760
617/653-6136

MS-DOS Users Group (SIG/86)
Joseph Boykin
47-4 Sheridan Dr.
Shrewsbury, MA 01545

Michigan
Southwestern Michigan IBM PC Users Group
R.K. Schmitt
2320 Crosswind Dr.
Kalamazoo, MI 49008
616/349-5381

Minnesota
Gustavus Adolphus PC User Group
Larry Potts
Gustavus Adolphus College
Saint Peter, MN 56082
507/931-7322

IBM PC Users' Group—Minneapolis
Peter LeNeau
P.O. Box 3163
Minneapolis, MN 55403

New Hampshire
Portsmouth PC Users Group
Cynthia W. Harriman
57 South St.
Portsmouth, NH 03801
603/436-1608

New Jersey
Amateur Computer Group of New Jersey
William S. Chin
P.O. Box 97
Iselin, NJ 08830

North Jersey IBM PC Club
Irving Lang
7 W. 45th St.
New York, NY 10036
212/869-5066

Personna Computer Association
The Int'l Association for the PC
Paul Cowan
P.O. Box 759
Point Pleasant, NJ 08742
201/840-0300

New York
BIBMUG-Buffalo IBM User's Group
William P. Hanley
P.O. Box 1487
Buffalo, NY 14221

Long Island Computer Association
Marvin Freifeld
3 Lindron Ave.
Smithtown, NY 11787
516/724-0574

Manhattan IBM Micro Club
Helaine Head
360 Central Park West
New York, NY 10025
212/222-9027

North American Amateur Computer Club
Brian Glasser
P.O. Box 106 Church St. Station
New York, NY 10008
212/674-1185

Northeastern New York IBM PC Users Group
Jim Cummins
5 Jacob St.
Ballston Lake, NY 12019
518/399-3016

NYPC, The NY IBM PC Users' Group
Eric A. Jaffe M.D.
Cornell University Medical College
1300 York Ave.
New York, NY 10021
212/472-6140

PECO Club
P.O. Box 255
Garnerville, NY 10923

(continues)

IN THE FLAT WORLD OF NETWORKING THERE IS A COLUMBUS.



NOVELL.

We Know How You Felt, Columbus!

In 1492 mast peaple were saying the warld was flat. They said, "Yau'll fall aff the edge if yau ga taa far." But that didn't stap yau Columbus. Yau went ahead and discavered America.

Taday, mast peaple are saying, "file service...is just nat feasible."* They're even saying, "aperatians like recard lacking are nat available."** But that hasn't stapped Navell, either. Because we've gane ahead and discavered, designed, yes... even built and shipped file servers that the less adventuraus said cauldn't be built. And aur file servers are up and running all aver America, (nat ta mentian the rest af the warld.)

Our Versatile Applied Server Technalagy (VAST) lets multiple aperating systems an multiple types af persanal camputers share the same disk space and directaries simultaneously.

And yes, all yau ather guys, recard lacking is available ...an the ShareNet/VAST system, anyway.

Discover the vast ShareNet Difference.

The trauble with the "civilized" warld af netwark-ing affered by aur campetitars is that they are still thinking FLAT! They're still cancentrating an the hard-ware cannectian instead af the saftware that makes that hardware functian. Just like Calumbus, Navell is the ONLY campany that can affer yau a VAST netwarking difference. We're thinking raund, yau see.

Does choosing a network have you "on edge"?

Dan't fall aff the edge! If netwarking—we mean real lacal area netwarking of numeraus PC's, running multiple aperating systems withaut madificatian ta "aff the shelf" saftware, having cancurrent file sharing, default file lacking, extensive data secur-ity and mare—saunds exciting ta yau, call us far a demanstra-tian sa yau can discaver yaur aptians. ShareNet/VAST will take yau aut af the "flat" baunded netwark warld and inta the baund-less universe af netwarks that wark.

Explore Novell's world!

Discaver the vast ShareNet difference. Yau'll find aut-af-this-world perfarmance at very dawn-ta-earth prices. ShareNet/VAST is easy ta use. All yau have ta da is call us and we'll set sail an a caurse that salves yaur PC networking prablems. Get an baard with the Calumbus af netwarking. Navell, Inc., 1170 Narth Industrial Park Drive, Orem, Utah 84057, 801 226-8202 · 800 453-1267

Novell—making networks work.
Our VAST difference.

*3Com Corp. in March Systems & Software, pg. 118
**3Com Corp. in March Systems & Software, pg. 119

NOVELL

Reader Service #128

User Group Dispatch

Ohio
ACORN: Greater Cincinnati IBM PC User's Group
Jerry Daiker
P.O. Box 3097
Cincinnati, OH 45201
513/741-8279

Akron/Canton PC Users Group
James C. Finucane
10690 Clapsaddle Ave.
Alliance, OH 44601
216/935-0252

Greater Cleveland PC Users Group
Roy McCartney
30704 Royalview Dr.
Willowick, OH 44094
216/944-5173

Oklahoma
IBM PC User Group
Roger Baresel
Deloitte Haskins & Sells
700 Fidelity Plaza
Oklahoma City, OK 73102
405/232-6191

Tri-County Tech
Tom Fowler
P.O. Box 3428
Bartlesville, OK 74005
918/333-2422

Oregon
Portland IBM Personal Computer Club
Rich Rohde
P.O. Box 2068
Beaverton, OR 97075
503/620-6862

Pennsylvania
International Personal Computer Owners
James B. Cookinham
IPCO, Inc., P.O. Box 10426
Pittsburgh, PA 15234
412/561-1857

Philadelphia Area IBM PC User Group
Bennett Landsman
2041 Harbour Dr.
Palmyra, NJ 08065
609/786-1441

South Carolina
PC Users' Group
P.O. Box 2794
Columbia, SC 29202
Source: ST5033

Tennessee
IBM PC User Group
Ross Burrus
Science Applications, Inc.
Plaza Tower #801
Oak Ridge, TN 37830
615/482-6649

Music City IBM PC User Group
Jeffrey J. Pack
MicroAge Computer Store
1602 21st Ave. S
Nashville, TN 37212
615/327-9669

Texas
Basic Society, Inc.
An Int'l Users Group
Drawer 345099
Dallas, TX 75234
214/484-9900

Central Texas User Group
Charles Weller
325 Explorer
Austin, TX 78734
512/261-6566

Dallas Fort Worth User Club
Samuel P. Cook
309 Lincolnshire
Irving, TX 75061
214/253-6979

HAL-PC
Rob Taylor
P.O. Box 610001
Houston, TX 77208
713/937-1342

IBM Club
David Andrews
3110 Honey Tree Ln.
Austin, TX 78746
512/327-0029

Southwest Computer Club
Sergio H. Salazar
Ohio Medical Products
9650 Railroad Dr.
El Paso, TX 79924
915/751-0465, 757-2661 ext. 262

Southwest Personal Computer User Group
Ronnie Van Winkle
William G. Barker & Associates
1009 W. Randol Mill Rd. #212
Arlington, TX 76012
817/270-2760

Texas User Group
Ken Holcombe
178 Tipperary
San Antonio, TX 78223
512/333-7163

Tyler IBM Club
Fred McDowell
318 Ferrett Pl.
Tyler, TX 75702
214/595-0976

(continues)

BRADY BOOKWARE™

Makes Computers Your Business



ICP Software Directory: Business Applications for Microcomputers

by International Computer Programs, Inc.

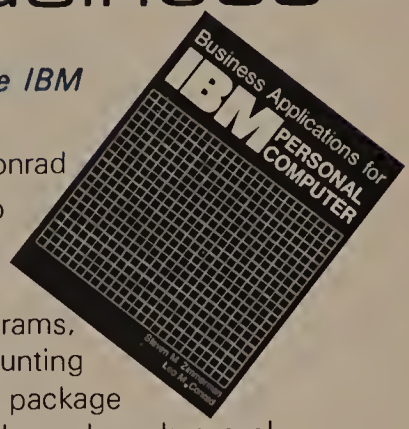
This unique sourcebook is the most complete and up-to-date directory of microcomputer software available. Offers clear and objective evaluations of business software programs for today's most popular microcomputers. Covering more than 1,000 products from over 350 companies, listings include hardware support, operating systems, languages, descriptions, prices and more.
1983/350pp/paper/D5327-4/***$19.95***
Deluxe Hardbound Version/***$26.95***



Business Problem Solving with the IBM PC & XT

By Leon Wortman

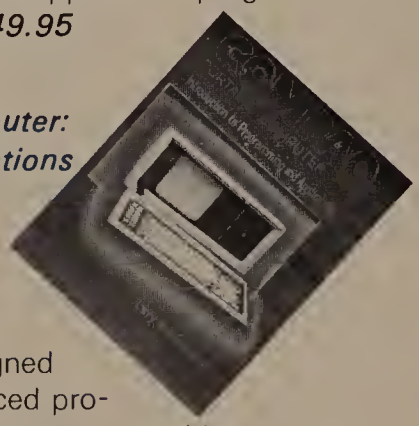
Broad in scope and jargon-free, here's a comprehensive new guide that includes dozens of programs designed exclusively for business problem-solving and decision-making with the PC. Comes complete with source codes in BASIC (so you'll know what you're doing and how you're doing it!) and many in Pascal. 29 programs plus descriptions of selected commercial software are all part of helping you write, revise and customize programs to suit your specific needs.
1983/350pp/paper/D2824-3/***$19.95***
Book plus a diskette of all the application programs from the book/D3421-7/***$49.95***



Business Applications for the IBM Personal Computer

By Steven Zimmerman, Leo Conrad

Finally! A practical approach to the many uses of your IBM PC for small to medium-sized businesses. With over 20 programs, you can set up your own accounting system and a financial analysis package that explores both your strengths and weaknesses! Plus, you'll find general business programs including invoicing, general ledger, check-writing and much more!
1983/350pp/paper/D2433-3/***$17.95***
Book plus a diskette of all the application programs from the book/D3510-7/***$49.95***



COMPAQ Portable Computer: Programming and Applications*

by Larry Joel Goldstein

A comprehensive tutorial guide to the intricacies of the powerful yet portable COMPAQ* computer! Designed for the novice and experienced programmer alike, this introductory text provides a complete overview to BASIC programming on the COMPAQ*, including extensive discussion on how to plan and execute computer programs. Also provides in-depth coverage of the operating system MS-DOS so you may successfully use purchased software for applications project. Plus, you'll find test-your-understanding questions to test your mastery as well as learn of the many applications and techniques for problem solving on your COMPAQ*!
1983/320pp/paper/D3898-6/***$18.95***

BRADY

Robert J. Brady Co.
Bowie, Maryland 20715
(301) 262-6300

Books available at all major bookstores & computer stores or call us toll free between 8 a.m. & 5 p.m. Eastern time at

1-800-638-0220

COMPAQ is a registered trademark of COMPAQ Computer Corp.

Reader Service #246

MICRO FLASH
COMPUTER SYSTEMS

MICRO FLASH HAS GROWN!

We have new, larger offices with a will-call facility for our Bay Area Customers!

We've added a new TOLL-FREE Telephone Order Desk for our Out-of-State Customers!

ALL PRODUCTS ARE FACTORY-FRESH AND GUARANTEED!

HARDWARE & PERIPHERALS	RETAIL	MICRO FLASH
AST Research MegaPlus 512K w/ 2S, 1P, & Clock	$1190.00	$975.95
CDC 9409 320K Disk Drive	500.00	289.95
Davong 5 MB A506 Hard Disk	**1995.00**	**1495.95**
Hayes Smartmodem 1200	699.00	498.95
Hayes Smartmodem 1200B Internal with Smartcom II	599.00	478.95
Printers (Oki, NEC, Diablo, Others)		$CALL$
Princeton Graphics Monitor	680.00	578.95
Practical Peripherals In-Line MICROBUFFER 64K	349.00	296.95
Seattle 8087 Package	395.00	289.95
Tandon TM100-2 320K Drive	**495.00**	**269.95**
Diskettes - 3M, Dysan, Others		$CALL$
SOFTWARE		
Applied Software VersaForm	$389.00	$291.95
Ashton Tate dBase II	**700.00**	**398.95**
Continental Home Accountant Plus	150.00	94.95
Digital Concurrent CP/M 86	350.00	278.95
FINANCIER Personal Series	195.00	158.95
IUS EasyWriter II DOS vers.	350.00	234.95
Lifetree Volkswriter	**195.00**	**124.95**
Link Systems DataFax	299.00	238.95
MicroPro Infostar	495.00	274.95
MicroPro Word/Mail/SpellStar	845.00	468.95
Microsoft Multiplan MS-DOS	275.00	169.95
Basic Compiler	395.00	276.95
Pascal	350.00	244.95
NEW MICROSOFT MOUSE	**195.00**	**$CALL$**
Oasis The Word Plus	150.00	128.95
Peachtree GL/AR/AP	595.00	374.95
RoseSoft ProKey	75.00	64.95
Scitor Project Scheduler	285.00	228.95
Sorcim SuperCalc II	195.00	158.95
Software Publishing PFS File	140.00	104.95
Software Arts TK! Solver	299.00	239.95
TK! SolverPacks	100.00	84.95

MANY OTHER PRODUCTS AVAILABLE! PLEASE CALL FOR PRICE QUOTES!

Please send certified or cashier's check to our NEW ADDRESS:

MICRO FLASH
1110 Burnett Avenue, Suite K
Concord, CA 94520

Out-of-State Orders Only: **(800) 458-2433**
For Price Quotes, Technical Services, and California Orders, call **(415) 680-1157**

No Credit Card Surcharge!

ONLY $6.00 UPS shipping/handling and insurance per order
Higher for printers & monitors—please call
CA residents add applicable sales tax
Items & prices subject to change
Minimum order $100.00
Dealer inquiries welcomed

Yes, I want to be a Micro Flasher! Please send me:

QTY PRODUCTS PRICE

___ _____ _____
___ _____ _____
___ _____ _____

Shipping, Handling, Sales Tax ..... _____
Total Enclosed ..... _____

Ship to
Name _____
Address _____
City, State, Zip _____
Phone # ( ) _____

Reader Service #108

User Group Dispatch

Utah
Utah Blue Chips
John Jaloszynski
P.O. Box 11901
Salt Lake City, UT 84147
801/487-5228

Utah ComputerLand
Debby Williamson
ComputerLand, 161 E. 200 South
Salt Lake City, UT 84111
801/364-4416

Virginia
Central Virginia IBM PC User's Group
Jim Love
P.O. Box 34446
Richmond, VA 23234
804/271-6173

IBM PC-Tidewater User Group
Vic Freeman
5237 Dundee Ln.
Virginia Beach, VA 23464

Washington
BorderLine IBM PC Users Group
Gary B. Rohrabaugh
3617 Portal Dr.
Bellingham, WA 98226
206/671-3181

PNW IBM PC Users Group
P.O. Box 3363
Bellevue, WA 98009

Wisconsin
Madison IBM-PC Users' Group
Philip J. Niehoff
P.O. Box 83
Madison, WI 53701
608/255-7641

Canada
IBM.PC Users Group of Winnipeg
BDI Business Development International
P.O. Box 5, Station A
Winnipeg, Manitoba
R3K 129 Canada

Northern Alberta PC User Group
Jim Laviolette
37 Brunswick Crescent
St. Albert, Alberta
T8N 2K5 Canada
403/458-9066

Personal Computer Association
National Organization for the Users of the IBM PC in Canada
P.O. Box 251
Ajax, Ontario
L1S 3C3 Canada

The Personal Computer Club of Toronto
P.O. Box 266, Station A
Toronto, Ontario
M5W 1B2 Canada

Vancouver PC Users Group
Allan Kelly
P.O. Box 48297 Bentall 111
Vancouver, B.C.
V7X 1A1 Canada
604/271-3883

France
Mikro-Cerio
Jean Roch
134 bis, Rue Du Vieux
Pont De Sevres
Boulogne, France 92100
609.94.14

Now! Teach yourself how and when to use the IBM PC--

with your PC as your private instructor!

PC Master® *is here* — the first research-validated, interactive IBM PC® training program guaranteed to transform you into a knowledgeable, confident PC user.

Even if you have never sat down at a computer before, PC Master will have you using your PC like a pro in just a few interesting hours.

PC Master guides you in the sequence you want and at your own pace — through the intricacies of Word Processing. Communications. Data Base Management. Electronic Spread Sheets. And it does it without computer jargon or dull, confusing manuals. But that's not all. PC Master also helps you explore the benefits of seven other major uses for your IBM PC, including education, graphics and financial planning.

We began with the Astronauts.

For more than a decade our staff of over 70 instructional development specialists have scientifically developed hundreds of successful employee and customer training programs. IBM, Prudential, Merrill Lynch and scores of other organizations rely on us for many of their most crucial training programs. And our unique training methods have proven long-lasting. So much so that the special task programs used to train NASA's space astronaut is still being used today — ten years later!

How we can make this guarantee.

Before releasing PC Master to the public we tested it in real-life situations with business executives, educators, students, professionals and senior training directors. After using PC Master for only a short time, their response was unanimous — PC Master is the best introduction to the IBM PC ever. Here are a few comments from actual users:

"Finally, someone did it right. Congratulations."

Dr. John Hughes, III/Los Angeles Baptist College

"Help! I made the mistake of testing your PC Master on my wife and 13-year-old son. How do I get my computer back?"

John Meade, President/Hagan Assoc

"As an international marketing firm, we constantly review new products. PC Master is one of the best designed packages we've ever tested. Your staff is to be congratulated."

Martha Biddle, President
MB International

Here's what you get:

PC Master includes three complete training programs that act as your own personal instructors. They use computer graphics, sound effects and interactive step-by-step instructions that make learning a pleasant, enjoyable activity.

What your PC can do for you: A hands-on guided tour through eleven of your PC's most useful applications.

When to apply your PC: Participate hands-on in the four most used applications — word processing, data management, communications and spread sheets. And you'll even learn how and when to choose the software that best suits your needs.

How to use your PC: How to run applications software programs. You take command of the keyboard and PC DOS in less time than it takes to see a movie!

Novice or experienced computer users can profit from PC Master.

You can use PC Master to introduce your business associates or family members to the exciting new world of computers. If you're a new user who doesn't want to waste valuable time in long, often boring classes, PC Master is the perfect answer to your needs.

GUARANTEE
If after using PC Master you or your company's management are not completely convinced PC Master is the finest and most complete interactive IBM PC training program available, return it within ten (10) days and we will refund your purchase price in full

Dealer inquiries invited.

Make your second best computer buy today.

Your first smart buy was choosing the IBM PC. Now make the second. Order PC Master today. And start finding out for yourself, in complete privacy, how and when to use all the potential power available in your PC.

FOR RUSH ORDERS CALL 1/800/227-3800 ext. 2351

Or clip and mail this coupon to:

Courseware,® Inc., 10075 Carroll Canyon Road, San Diego, CA 92131.

Please send me____ PC Master at $79.50. Price includes shipping. California, C add 6 %. ____ Check enclosed

MC NO._____ VISA_____

NO. _____ EXP. DATE _____

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

SIGNATURE _____

_____ Purchase Order no. (if relevant)



COURSEWARE®

PC Master is a trademark of Courseware, Inc. IBM PC is a trademark of IBM Corporation.

Reader Service #288

LOOK WHO BUYS SOFTWARE FROM US!

IBM • XEROX • NCR
CHEVRON • IRS • SPERRY
JFK SPACE CENTER • ARAMCO
JOHN DEERE • PRICE WATERHOUSE
HEWLETT-PACKARD • GENERAL ELECTRIC
GENERAL DYNAMICS • HONEYWELL • CONTROL DATA

If you order software from us, you're in good company. You see, some of our best customers are America's biggest corporations.

Maybe they're attracted by our low, low prices (big companies are price-conscious too!)

Or maybe when you're an "IBM", you're looking for something extra. Like the personal service, giant inventory, and in-depth technical support you'll find at 800-SOFTWARE.

You see, when you call *us*, we'll take care of you like our business depends on it. Because it does. Which means when you place an order, you can be sure we'll fill it the same day. And that our unique Order Tracking System™ is keeping tabs on your order every step of the way.

Most important, we'll be there if you need us *after* your software arrives. We'll make sure that you'll receive the finest post-delivery service in the industry. And that's a promise.

Next time you're looking for low price *and* great service, do what IBM, General Electric, and a lot of other big companies do. Pick up the phone and give us a call.

We'll show you why some hard-headed companies buy their software from us.

CHECK OUT ALL OUR INCREDIBLE BUSINESS SOFTWARE PRICES.

WordStar® $269	dBASE II™ $459	SuperCalc 2™ $139	Multiplan™ $199
WordStar®/ MailMerge™ $369	**InfoStar™ $299**	**VisiCalc™ $189**	**PerfectWriter™ $289**

A.L.S.™		dGraph	$229	SpellStar	$149	Perfect Writer/Speller	$409
Z-80 Card	$129	dUtil	$ 69	ReportStar	$229	Perfect Calc	$169
CP/M Card	$359	**HAYES™**		Other Products and Specials	CALL	Perfect Filer	$279
Smarterm	$149	Smart Modem	$549	**MICROSOFT®**		All Four Perfect Products	$799
ALPHA SOFTWARE™		**HOWAROSOFT™**		RAM Card™	$ 89	**PICKLES AND TROUT™**	
Apple-IBM Connection	$150	All Products	CALL	Softcard™	$259	CP/M for TRS Model II	$169
Executive Package	$115	**IUS™**		Videoterm (Videx™)	$269	CP/M for TRS Model 16	$189
Other Products	CALL	Easywriter II	CALL	All Three Above	$509	Hard Disk	$225
APPLIED SOFTWARE TECHNOLOGY™		Easyspeller II	CALL	MBASIC 80	$275	**SOFTWARE PUBLISHERS™**	
Versaform	$289	Easywriter Speller	CALL	BASIC Compiler	$295	PFS File	$ 95
ASHTON-TATE™		Easyfiler	CALL	COBOL Compiler	$549	PFS Report	$ 95
dBase II	$459	Financial Management Series	CALL	FORTRAN 80	$349	PFS Graph	$ 95
ASPEN SOFTWARE™		**LEXISOFT™**		Multiplan	$199	**SORCIM™**	
Grammatik	$ 60	Spellbinder	CALL	Flight Simulator	$ 45	SuperCalc	$129
Random House Proofreader	$ 39	**LIFETREE SYSTEMS™**		Enhancer II (Videx™)	$119	SuperCalc	$139
Random House Thesaurus	$119	Volkswriter	CALL	Other Products	CALL	SuperWriter	$179
C.M.B. III ENTERPRISES™		Lotus™ 1-2-3	$399	**MICROSTUF™**		SpellGuard	$139
WS Patch and WS Keys	$ 45	**METASOFT™**		Crosstalk	$119	**VISICORP®**	
COMPUTING!™		Benchmark	CALL	**OASIS™**		VisiCalc	$189
Power!	$119	**MICROLAB™**		The Word Plus	$129	VisiTerm	$ 85
CONTINENTAL SOFTWARE™		Tax Manager	$179	Punctuation and Style	$109	VisiDex	$189
Home Accountant	CALL	**MICROPRO®**		**ORGANIC™**		VisiFile	$249
DIGITAL RESEARCH™		Wordstar	$269	Milestone	$269	VisiSchedule	$249
CBASIC	$109	Wordstar MailMerge	$369	**PBL CORPORATION™**		VisiTrend/Plot	$249
CB 80 Compiler	$379	Wordstar/MailMerge/SpellStar	$509	Personal Investor	$105	VisiWord	$299
PASCAL/MT+	$259	Wordstar InfoStar	$549	**PEACHTREE™**		Business Forecaster	$100
SPP	$155	MailMerge	$149	Accounting PeachText Others	CALL	Desktop Planner	$249
Access Manager	$225	InfoStar	$299	Series 4 Accounting Modules	$369 ea	**FLOPPY DISKETTES** (Boxes of Ten)	
Display Manager	$299	CalcStar	$ 89	**PERFECT SOFTWARE™**		8"	$ 25
CBASIC 86	$149	DataStar	$179	Perfect Writer	$289	5" (SS)	$ 25
PASCAL/MT+ 86	$299	SuperSort	$149	Perfect Speller	$169	5" (DS)	$ 35
Concurrent CP/M 86	$259					Large Quantities	CALL
CP/M 86	$49						
FOX AND GELLER™							
Quickcode	$229						

WRITE:
800-SOFTWARE, INC.
940 Dwight Way, Ste. 14
Berkeley, CA 94710
CA residents
add sales tax.

800-SOFTWARE

TO ORDER, CALL TOLL-FREE: 800-227-4587
IN CALIFORNIA: 800-622-0678 or 415-644-3611

- ☐ Purchase orders accepted. Please call us in advance
- ☐ Prompt UPS 3 day Blue Label
- ☐ Call for shipping charges *free catalog*, and other low software prices
- ☐ Now open Mon - Sat
- ☐ International and national dealer requests welcome
- ☐ Quantity discounts available
- ☐ Prices may change

Copyright 800 Software 1983
Microsoft is a registered trademark and Softcard RAM Card and Multiplan are trademarks of the Microsoft Corporation

Reader Service #214

Running Out to Buy a Computer?



Or some software, or a modem, or a printer?

Are you making the right decision?

Do you know who makes the best product for the price?

Are you sure the company supports its products?

How can you find all this out—soon enough to make smart buying decisions?

Simple . . .

Subscribe to InfoWorld, the only microcomputer newsweekly.

InfoWorld is the source of information for people who get the right equipment—every time they buy. They read InfoWorld's in-depth product reviews, the most respected and quoted reviews in the industry. They read weekly columns, like "Getting Started" and "Inside Track." They get the kind of insight that can save them thousands of dollars.

As an InfoWorld reader, you'll join an elite club of people who know what's hot and why—and buy accordingly.

So before you run out and buy that computer, make sure you're an InfoWorld reader. We'll give you the straight scoop every week.

InfoWorld
The Newsweekly for Microcomputer Users

If the coupon is missing, send your subscription request to: InfoWorld, Circulation Department, 375 Cochituate Road, Box 837, Framingham, MA, 01701. Please enclose a check for $31.00, to start your year's subscription to InfoWorld.
Or call toll-free from outside Massachusetts (800) 343-6474
From Massachusetts call (617) 879-0700

I want to be the first to know! Please start my subscription to InfoWorld, the newsweekly for microcomputer users.

Rates: U.S. $31.00; Canada, Central & South America $65; Europe $100; All Other Countries $170 (Air Mail)

☐ My check is enclosed
☐ Am Ex ☐ BofA/Visa ☐ MC (MC Only list four digits above your name)

If charge, we must have cardholder's signature _____ Expiration Date: _____

NAME _____

(TITLE) _____

(COMPANY NAME) _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

☐ Check here if you do not wish to receive promotional mail.

Send this coupon to: InfoWorld, Circulation Department, 375 Cochituate Road, Box 837, Framingham, MA, 01701.

MICRO MART MEANS BUSINESS AT A DISCOUNT

floppy disk drives

TANDON TM 100-2 FULLY IBM PC COMPATIBLE **$239**

HALF HT. SHUGART SA455
HIGHEST QUALITY FOR IBM PC· 12 MONTH WARRANTY

networking/protocol conversion

PCnet by Orchid Technology
DISC, PC, PRINTER, SHARING & FILING LOCKING

DAVONG MultiLink
SHARED RESOURCES UP TO 255 PCs OR XTs

PERSYST DCP/88 • IBM HASP
HARDWARE/SOFTWARE • 3278 TERMINAL EMULATOR

SNA PRODUCTS

BABY TALK
- 64 KZ-80 TYPE CARD
- MULTI-TERMINAL EMULATOR
- 300/600/1200 SUPERSMART MODEM
- SPOOLER VIA PARALLEL OR SERIAL PORT

IRMA by TAC

BLUE LYNX
5251 EMULATOR

printers

EPSON FX 80 & 100 (160 CPS)	Best Price!
EPSON MX100 (100 CPS)	Best Price!
EPSON RX80 (100 CPS)	Best Price!
OKIDATA ML92 & 93 (160 CPS)	Best Price!
OKIDATA ML 84 (200 CPS)	**$999**
OKIDATA Pacemark 2350 & 2410	Best Price!
C-ITOH Prowriter/Prowriter 2	**$399/$695**
C-ITOH Starwriter (40CPS)	**$1175**
Printmaster (55CPS)	**$1495**
IDS PRISM 80 & 132 200 SPRINT	Best Price!
DIABLO 620 & 630	Best Price!
NEC 3550 & 1730 Spinwriter	Best Price!
GEMINI 10X & 15X Dot Matrix	Best Price!
TRANSTAR Color Printer	Best Price!
COMREX CR-1	Best Price!
Mannesman Tally 160L	**$679**
Mannesman Tally 180L	Best Price!
MICROFAZER (8K-128K) Spooler	Starting at **$139**

keyboards

Colby	CALL!
Keytronics KB	CALL!

64 K RAMCHIPS

64K-9 Chip/Upgrade Kit	**$55**
192K-27 Chip/Upgrade Kit	**$159**

VERBATIM DISKETTES
DATA LIFE • 5 YEAR WARRANTY

Double Sided Box of 10 **($39)**	Case of 10 **($339)**
Single Sided Box of 10 **($30)**	Case of 10 **($249)**

multifunction boards

QUADLINK Run Your Apple Software on IBM-PC	Best Price!
QUADBOARD QUADRAM • 64K-256K • RAM DISC • Spooler	**$279/$439**
AST Megaplus Board MAXIMUM: 8 functions (64K-512K)	Best Price!
AST 1/0 Plus Serial, Opt 2nd Serial, Opt Par., Opt GAME	Best Price!
PERSYST Time Spectrum • Multifunction 64K-512K	Best Price!
TECMAR Multifunction Boards	Best Price!
SEATTLE RAM +3 64K-256K • Serial • Parallel • Flash Disk • Clock	Best Price!
TALL TREE 512K.J. RAM-w/Jet Drive	**$650**
PROFIT SYSTEMS 64K-512K • RAM PLUS & ELITE	**$299/$680**
ANATRON 3 External 1/0 Ports Using Only One Slot • "answer RAM" 64K-256K	Best Price!
BYAD 64K Multifunction CPM Card	Best Price!
BABY BLUE 64K CPM Card	Best Price!
EASIBOARD 9 Functions	Best Price!

monitors

QUADCHROME Super Hi Res. 690x480	Best Price!
PGS Hi Res. 690 Dot RGB	Best Price!
AMDEK 12" 310 Amber Improved Alternative To IBM Monochrome	**$185**
ZENITH ZVM 122 FOR IBM Monochrome Card	Best Price!
USI MONITORS	Best Price!
AMDEK 12" 300G/300A	**$149/$159**

software

VOLKSWRITER	$125
WORDSTAR Professional Series	CALL!
MultiMate	CALL!
SuperWriter Sorcim W/P, Speller & Mailmerger	$169
Final Word	CALL!
WORDPLUS-PC W/P, Mailmerger	CALL!
Rainbow Writer Color Text Formater	CALL!
Easy Writer II IUS	$199
Easy Speller IUS	$89
Easy Filer II IUS	$199
Easy Planner II IUS	$129
IUS 3-Pack General Ledger, Acc. Pay., Acc. Rec.	$897
Peach Text 5000	CALL!
VisiCorp Series	CALL!
VisiWord	CALL!
INFOSTAR	CALL!
FRIDAY!	CALL!
dBase II Ashton-Tate	$399
Bottom Line Strategist	CALL!
QUICKCODE	CALL!
dGraph	CALL!
dUtil	CALL!

MICROSOFT COMPILERS

Basic • Cobol • Fortran • Pascal

MultiPlan	$169
SUPERCALC II	$165
T. K. Solver	CALL!
Norton Utilities	$65
ALPHA Executive Package 40 Business Programs!	CALL!
ALPHA Data Manager II Integrates VisiCalc & Wordstar (123 Compatable)	CALL!
CROSSTALK Microstuf	$109
SMARTCOM Hayes	CALL!
ProKey	CALL!
Concurrent CP/M-86	$280
CPM	CALL!
CBasic 86	$160
P.C. Tutor	$55
Frieze Graphics Screen Print/Store	$55
BPS Business Graphics	CALL!
FINANCIER Personal • Tax Series	$119
Dow Jones Mkt Analyzer	CALL!
Dow Jones Mkt Manager	CALL!

graphic cards

QUADRAM Color Card Hi Res	CALL!
PLANTRONICS COLOR PLUS Biplaner Super Hi Res	CALL!
GRAPHICS MASTER Tecmar	CALL!
HERCULES Monochrome Graphics/Supports Lotus 1-2-3	CALL!
AMDEK 12" 300 G/300A For Color Graphic Card	$149/$159
AMDEK MAI Color Graphics/Monochrome • 640 x 400 Res. • 8 Pages Storage • Parallel Printer Port • 128K DRAM Allocates 96 K User RAM • Erasable UV Prom	CALL!
USI Monochrome/Color Graphics • Parallel Printer Port • Flicker Free Scolling • 32K • True DMA	CALL!

modems

HAYES SMARTMODEM 1200	CALL!
HAYES SMARTMODEM 300	$209
HAYES 1200B New Plug-In Modem Card	CALL!

hard disks

DAVONG 5, 10, or 15 Meg/F Hard Disk	Starting at $1395
TOP-LINE 12.5, 20, 30 Hard Disk w/Streamer Tape/Can't Advertise!	CALL!
TOP-LINE STREAMER TAPE Back Up for IBM XT	CALL!

*IBM is a registered trademark of International Business Machines

MICRO MART

ATLANTA WAREHOUSE SHIPPING

6889 Peachtree Industrial Blvd., Norcross, GA 30092

ORDERS ONLY 1-800-241-8149 • **For Information 1-404-449-8089**

EVEN AN IBM PC® NEEDS A SAFETY NET.

Only Alloy's PC-Backup™ gives you high performance storage/retrieval, and protection – at a lower cost.

Now that the IBM PC comes with a 10 Mbyte hard disk, you need a Backup that can keep up with it. Alloy's PC-Backup is designed to do just that – and it beats flipping floppies every time.

Alloy's PC-Backup works like your business does: it is file-oriented, backing up files in an organized way. It is time and cost efficient too, because it never lets you lose important data.

Designed exclusively for the IBM PC, and small to large businesses, here are some of the features that make Alloy's PC Backup the finest safety net PC owners could ever require:



- Winchester hard disk backup and restore
- Comprehensive menu driven software package (Alloy's industry standard Tape Interchange Package)
- High speed data transfers
- Up to 16.5 Mbytes of data per cartridge

At your ISO now for only $1,995.

Also available, Alloy's new 9-track tape drive, for mainframe compatibility.

Alloy Computer Products
100 Pennsylvania Avenue
Framingham, Mass. 01701
(617) 875-6100

IBM PC is a registered trademark of IBM Corp PC-Backup is a trademark of Alloy Computer Products

ALLOY

Computer Products



Reader Service #315

World Events

A calendar of regional, national, and international events

Edited by Patricia Navone

World Events lists computer-related conferences, conventions, workshops, camps, symposiums, trade fairs, and shows. If you know of an upcoming event, we'd like to hear from you.

September 9-10
PC II International Show and Conference
Skyline Hotel
Toronto, Canada
Approximately 75 exhibitors; four educational seminars daily. Plenary session for user groups.
H.F. McLelland
Personal Computer Association
P.O. Box 251
Ajax, Ontario
L1S 3C3 Canada
Telex 06-986766

September 11-14
Graph Expo '83
McCormick Place
Chicago
Trade show for printers, typesetters, and graphic artists. Includes printing equipment and supplies, computer hardware and software, and services for the graphic arts industry.
J. Roberts
Graphic Arts Show Co., Inc.
6849 Old Dominion Dr. #200
McLean, VA 22101
703/734-8285

September 13-15
Federal Computer Conference
Washington D.C. Convention Center
Aimed at managers of ADP equipment, software, and services from both the federal government and the private sector.
Phyllis Danieli
Federal Computer Conference
P.O. Box 368
Wayland, MA 01778
800/225-5926, 617/358-5181

September 13-15
Midcon/83
O'Hare Exposition Center
Rosemont, Illinois
A high-tech electronics exhibition and conference. Primarily for design, manufacturing, and test engineering.
Jeanie Oldendorph
Electronic Conventions, Inc.
8110 Airport Blvd.
Los Angeles, CA 90045
800/421-6816, 213/772-2965

September 13-15
WPOE '83
San Jose Convention Center
San Jose, California
Word processing and office environment trade show and conference. Includes software, telecommunications, small-business systems, and electronic mail.
Dixie Gurley
Cartlidge and Associates, Inc.
4030 Moorpark Ave. #205
San Jose, CA 95117
408/554-6644

September 13-15
Mini/Micro Midwest
O'Hare Exposition Center
Rosemont, Illinois
Exhibitors are manufacturers and suppliers of computer peripherals, data communications, and software. For system designers, integrators, assemblers, systems engineers, and software specialists.
Candy Kurz
Electronic Conventions, Inc.
8110 Airport Blvd.
Los Angeles, CA 90045
800/421-6816, 213/772-2965

September 15-16
2nd Annual Indiana Computer Expo
Indianapolis Convention Center
Designed for business end users. Mini and microcomputers, software, word processing, graphics, services, and peripherals.
Trade Show Department
Ernie Kerns and Associates
2555 E. 55th Pl. #201
Indianapolis, IN 46220
317/259-8111

September 15-18
Second Annual Twin Cities Computer Show and Software Exposition
Minneapolis Auditorium
Minneapolis
Features microcomputers including business systems, home and personal computers, video games, software, services, and peripherals.
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 02167
800/841-7000

(continues)

CompuShack™

PRICES AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE
ALL RETURNED MERCHANDISE SUBJECT TO A 20% RESTOCKING FEE.
ADD 10% FOR NET TERMS
PRICES GOOD IN U.S. ONLY.
PRICES REFLECTED IN THIS SECTION ARE LOWER THAN FRANCHISE STORES.



IBM Special of the Month!

IBM PC- COMPLETE LINE

IBM
PC System includes 64K IBM-PC with 320KB Floppy Disk Drive, Controller, Color Graphics Card, Monitor. All for only **$2599.00**

LOTUS 1-2-3 SOFTWARE .. $459

AST RESEARCH
IO Plus–Parallel & Serial Port, Clock Calendar W/Bat back-up, Superdrive, Superspool . . . **$199.00**

Combo Plus- 256K, Parallel & Serial Port, Clock Calendar W/Bat. back-up, Superdrive, Superspool **$499.00**

Mega Plus- 512K, Parallel & Serial Port, Clock Calendar W/Bat back-up **$999.00**

QUADRAM
Quad Board - 256K, Parallel Port, Serial I/O, Clock Calendar with battery backup **$599.00**

512K Ram with Serial I/O **$799.00**

HERCULES GRAPHICS CARD
This card gives you 720 x 350 graphics **$499.00**

BIG BLUE $479.00

MAYNARD SANDSTAR SERIES

Multifunction Card	**$95.00**
Floppy Disk Controller	**$225.00**
Memory Card	**$189.00**
Add-On Memory Module	**$99.00**
Parallel Port Module	**$75.00**
Serial Port Module	**$95.00**
Clock Calendar Module	**$75.00**
Games Adapter Module	**$59.00**

OTHER PRODUCTS FOR IBM

THE ULTIMATE SOLUTION TO THE PC EXPANSION DILEMMA FROM LNW COMPUTERS FOR YOUR IBMPC AND PCXT

BUSBOARD "MOTHERBOARD". Allows for addition of eleven (11) different modules and additional processing power through coprocessor BUS **$349.95**

LNW80 CP/M PLUS® COPROCESSOR MODULE. Z80A module runs CP/M® and CP/M PLUS® as well as CP/M 2.2 programs. For use in both 5" and 8" disk drives **$249.95**

ASYNCHRONOUS COMMUNICATIONS I/O. Allows each Busboard to contain up to 8 separate serial asynchronous channels with a total of 15 different channels **$79.95**

5" OR 8" FLOPPY DISK I/O MODULE. Replaces disk controller in PC and is compatible with diskettes from other CP/M 86® and CP/M® systems **$169.95**

PARALLEL PRINTER I/O MODULE. Multi-user Printer port addressing, or general purpose 8-bit I/O port **$49.95**

CLOCK CALENDAR I/O MODULE. Operates both CP/M 86® and MSDOS®. Also includes back-up battery and Alarm function **$69.95**

GAME I/O MODULE. Compatible with IBM PC Game I/O card. Allows for connection of either 2 joysticks, or 4 paddles **$49.95**

DIRECT-CONNECT MODEM I/O MODULE. Features answer/dial in tone or pulse for low cost long distance services. Program listing allows for smart modem under BASIC. Speed dialer program included **$149.95**

A/D I/O MODULE. 16 independent multiplexed analog input channels w/8 bits of resolution per channel **$109.95**

8 BIT I/O MODULE. Both latched 8 bits output and input with interrupt capability fully supported. User programmable port addressing for up to 8 modules per Busboard **$59.95**

PROTOTYPING I/O MODULE. Utilizes 3M Scotchflex Breadboard prototyping system. Complete with 40 conductor I/O BUS connector and an assortment of prototyping pins **$29.95**

WORD PLUS—PC
Word Processing Software **$299**

HARD DISK SYSTEMS FOR IBM AND APPLE

DAVONG FOR IBM

	Internal	External
5MB	**$1495**	**$1695**
10MB	**$1795**	**$1995**
15MB	**$2295**	**$2495**
21MB	**$2595**	**$2795**
32MB	**$2995**	**$3195**

FLOPPY DISK DRIVES

SHUGART

SA400 SS/SD	**$169.00**
SA450 DS/DD	**$239.00**
SA800/801 SS/SD	**$365.00**
SA850/851 DS/DD	**$459.00**





TANDON

TM-100-1 SS/DD	**CALL**
TM-100-2 DS/DD	**CALL**
TM-100-4 DS/DD	**$359.00**
TM-848-1 SS/DD	**$425.00**
TM-848-2 DS/DD	**$499.00**

SIEMENS

FDD 100-5	**$159.00**
FDD 200-5	**$199.00**

DISK DRIVES
For IBM PC

Tandon 100-2	**CALL**
Teac 55-B Slimline 320K8	**$260**
Shugart SA-455 Slimline 320K8	**$250**

THE BUSINESS MANAGER
Integrated Accounting System
The best and most complete business program package on the market. Providing all the software and storage you ever wanted. All software pre-installed on 10 or 15MB hard disk and ready to run. No more diskettes and tedious paper work. High speed. All programs self-prompting and menu driven. Fully guaranteed and supported. **Includes: General Ledger Accounts Receivable Accounts Payable Billing Inventory Payroll Word Processor Spelling Checker File Management Spreadsheet Database Management System . . . . . CALL**

PRINTERS

TAVA PRINTERS BY DIABLO

DOT MATRIX PRINTERS

Model 11	
80 Column/100 CPS	**CALL**
Model 31	
132 Column/100 CPS	**CALL**
Model 32	
132 Column/150 CPS	**CALL**
Model 38	
132 Column/400 CPS	**CALL**

DAISY WHEEL PRINTERS

Model 620	
132 Column/20CPS	**CALL**
Model 630	
API/40 CPS Letter Quality	**CALL**
Model 630	
ECS/API-40CPS Multi-Lingual	**CALL**

Daisywriter Daisywheel
Printer **$999.00**

NEC SPINWRITER



7710-1	**$1995**	3510	**$1395**
7715-1	**$2195**	3515	**$1395**
7730-1	**$1995**	3530	**$1595**
7720-1	**$2595**	3550	**$1895**
7725-1	**$2595**	PC8023A	**$ 495**

STAR MICRONICS

Gemini 10	**CALL**
Gemini 15	**CALL**

SMITH CORONA

TP-1 parallel	**$579.00**
TP-1 serial	**$579.00**

C-ITOH

GX-100 (50 CPS Dot Matrix)	**$249.00**
8510	**$469.00**
1550 (15")	**$699.00**
F-10 (40 CPS, Letter Qual.)	**$1395.00**
F-10 (55 CPS, Letter Qual.)	**$1695.00**

OKIDATA

82A	**$429.00**
83A	**$699.00**
84AP parallel	**$999.00**
84AS serial	**$1099.00**
92A	**$525.00**
93A	**$999.00**

IDS PRISM

Prism 132 (B & W)	**$1395.00**
Color	**$ CALL**

BROTHER

HR-1 A parallel	**$769.00**
HR-1 A serial	**$869.00**
HR-15	**$599.00**
Tractor feed option	**$135.00**

MONITORS

AVAILABLE (All Models)	**CALL**
PRINCETON GRAPHIC SYSTEMS	
His Res. Color	**CALL**

APPLE IIe
Computer System, Controller, Two Disk Drives, Monitor **$1890**

TAVA PLUS COMPUTER SYSTEM (APPLE II+ COMPATIBLE)
64K CPU Expandable to 128K 2 Disk Drives Controller Card Monitor, Parallel Port, Serial Port, 2 Game I/O's, CP/M® on board, DOS 3.5 **$1299**

Apple II+ Compatible Computer System W/48K of memory One "Data Drive" disk drive Controller card 12" green screen Hi-Resolution Monitor A Cables are included for a Compushack price of **$999.00**

Additional Drive
With purchase of above System **$100.00**

OTHER PRODUCTS FOR APPLE

Special of the Month!

$259



TAVA CORP. DATA DRIVE

100% Compatible Disk drive for APPLE II+ and APPLE IIe Runs DOS, CPM® Pascal software

SLIMLINE DRIVE $269.00

TAVA PRODUCTS FOR APPLE

Cooling System and Power Monitor	**$59**
Joystick	**$49**
80 Column Card	**$149**

HAYES MICROCOMPUTER PRODUCTS

Micromodem II 300 baud	**$299.95**
Smartmodem 1200 baud	**$529.95**

PERSONAL ACCOUNTANT
Software for your Apple IIe and Apple II+ **$199.00**

EPD PRODUCTS

Lemon Surge Protector	**$49.95**
Lime Surge Protecto	**$79.95**
Peach Surge Protector	**$89.95**
Orange Surge Protector	**$129.95**
Plum Surge Protector	**$48.95**

DEC Rainbow 100
Keybaord, CPU, Z-80/8088, 64K Serial RS232 Port, Two X-400KB Disk Drives, Monitor, CP/M86®/80 Software **CALL**

CompuShack

COMPUSHACK FRANCHISES AVAILABLE

California	Concord	(415) 828-4752
	Irvine	(714) 261 1000
	La Mirada	(213) 947 9505
	San Fernando	(213) 906 7000
	San Ramon	(415) 838-2233
	Tustin	(714) 730-7227
	Walnut Creek	(415) 945-8011
Idaho	Twin Falls	*
Illinois	Chicago	(312) 964-4612
New York	New York	(800) 228 5525
	Rochester	(716) 924-2544
	Rome	(315) 336 0265
Texas	Austin	(512) 25 1062
Washington	Richland	*
	Spokane	*
Wisconsin	Verona	(608) 845 7110
Canada	Toronto	(416) 249 8601
U.K.	London	01 935-0480

PRODUCTS AND PRICES NOT AVAILABLE AT ALL STORES

CALL FOR NUMBER

(714) 261-1000
FRANCHISE INQUIRIES WELCOME
16861 ARMSTRONG, IRVINE, CA 92714
HEADQUARTERS/TELEX: 181667—ANSWER BACK: COMPDSHACK IRIN

ALL FLOPPIES REPAIRED QUICKLY AT LOW COST

*IBM is a registered trademark of IBM Corporation
*APPLE is a registered trademark of Apple Computers Inc
*CP/M and CP/M86 are registered trademarks of Digital Research Inc

September 16-18
Compufair Seattle
Seattle Center Exhibition Hall
A personal computer show. Demonstrations for business, home entertainment, and education. Seminars on the use of PCs for children and the future of personal computers.
Tom Ikeda
Compufair, Inc.
909 N.E. 43rd St. #302
P.O. Box 45218
Seattle, WA 98105
206/633-FAIR

September 19-23
9th World Computer Congress
Palais des Congres
Paris, France
Technical programs, exhibitions, and seminars. Organized by the International Federation for Information Processing.
Registration Center
The Rand Corporation
1700 Main St.
Santa Monica, CA 90406

September 22-24
Second Annual Rocky Mountain Computer Show & Software Exposition
Denver Merchandise Mart
Denver
Features microcomputers including business systems, home and personal computers, video games, software, services, and peripherals.
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 02167
800/841-7000

September 22-25
New York Computer Showcase Expo
New York Coliseum
A regional exposition for business, professional, and corporate users of personal computers and word processing systems. Features hardware, software, peripherals, media, supplies, and services relating to mini and microcomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 22-25
Detroit Computer Showcase Expo
Cobo Hall
Detroit
A regional exposition for business, professional, and corporate users of personal computer and word processing systems. Features hardware, software, peripherals, media, supplies, and services relating to mini and microcomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 22-25
Atlanta Computer Showcase Expo
Atlanta Apparel Mart
A regional exposition for business, professional, and corporate users of personal computer and word processing systems. Features hardware, software, peripherals, media, supplies, and services relating to mini and microcomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 29-October 1
CP/M '83
Hynes Auditorium
Boston
An international conference and exposition for the CP/M industry and users. Includes manufacturers, software developers, OEMs, venture capitalists, software publishers, distributors, and dealers. Conference program features noted leaders from the software industry.
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 02167
800/841-7000

September 29-October 2
Computers in Health Care '83
Red Lion Inn
Sacramento, California
A symposium and exhibition for health care professionals. Includes educational software, computer legal and purchasing considerations, data and word processing, biomedical engineering, and case management.
Mary Tuma McAdams or Irene Elson
Eskaton Health Corporation
1501 El Camino Ave.
Sacramento, CA 95815
916/927-3480

(continues)

WAREHOUSE
SOFTWARE
(602) 842-1133
TOLL-FREE
1-800-421-3135

CALL FOR PROGRAMS NOT LISTED.WE WILL TRY TO MEET OR BEAT ANY LEGITIMATE PRICE FOR CP/M OR IBM PC SOFTWARE.

— MOST DISK FORMATS AVAILABLE —

DATA BASE MANAGEMENT SYSTEMS.

BUY OF THE YEAR!
DBASEII+EVERYMANS DATA BASE PRIMER+EXTRA DISKETTE WITH DBASE ACCOUNTING, MAIL LIST AND INVENTORY PROGRAMS. IBM PC AND CP/M—CALL FOR OUR SPECIAL PRICE.
FOX AND GELLER QUICKCODE WITH DBASE PACKAGE $175

DB+SORT $99
Condor III $445
NWA Statpack $349
TIM $285
Infostar ..... Call

WORD-PROCESSING PACKAGES
Wordstar, Mail Merge, Spellstar $395
Wordstar $265
Mail Merge $135
Spell Star $145
Lexisoft Spellbinder $270
Aspen Spellchecker $36
Metasoft Benchmark $335
Sorcim Spellguard $135
Peachtext $285

SPREADSHEETS
Calcstar $95
Supercalc $185
Microsoft Multiplan $185

ACCOUNTING
#TCS•Equivalent of Peachtree•Specially Augmented By Warehouse Software Customized For Your IBM•Terminal and Printer-
GL, AR, PA, AP ..... Each Module $75
..... For All Four $275
CYMA ..... Call
Peachtree GL, AR, AP $285

TRANSFER PROGRAMS
IBM PC Move-It $110

Best Price in U.S.
Seven Function Board—Includes Async Adapter, Parallel Adapter, Clock with Battery Back-Up and Software, Game Port, 64K Memory Expandable to 512K.
1 year warranty ..... $2??

Floppy Disk Controller w/Par. or Serial Port $235
Plantronics Color + Board $365
Tandon 100-2 Drives ..... Call
Toshiba 1/2 height drives ..... Call
256 K Ram Board W/Async Port ... $365

!!!!!! MONEY BACK GUARANTEE !!!!!!
For the IBM PC—Fifty Six Utility Programs including: Label Program—Check Reconciliation—Numeric Conversion—IBM & EPSON Printer Set—Calculator Program—Interest Computation—Function Key Set—Menu Generation—Plus 47 others all for **$24.95 post paid** — (requires 360K drives —160K drive version with 40 programs only **$19.95 post paid)** If you are not completely satisfied return within 15 days for full refund.

Hayes Smartcom Program $75

PCDOS
IBM PC Volkswriter $125
PCII Copy Program $34
Datamost Write-ON $94
Real Estate Investment Prog. $94
Microsoft Flight Simulator $38
Howard Real Estate Analyzer II $185
IBM PC CP/M 86 ..... $49
CBasic86 ..... $145
CIS Cobol86 ..... $595
Palcal MT+86 W/Spp $450

TERMS: Prices include 3% cash discount Add 3% for charge orders. Shipping on most items $5.00. AZ orders +5% sales tax.

WAREHOUSE SOFTWARE
4935 West Glendale Ave., Suite 12
Glendale, AZ 85301
(602) 842-1133 Technical Information

VISA
MasterCard

Reader Service #264

World Events

September 29-October 2
San Francisco Computer Showcase Expo
Brooks Hall
San Francisco
A regional exposition for business, professional, and corporate users of personal computer and word processing systems. Features hardware, software, peripherals, media, supplies, and services relating to mini and microcomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 30-October 3
The Norden Home Electronics Fair
Stockholm, Sweden
Primarily a home computer show. Includes games, electronics, and teledata equipment.
Kjell Fagerberg
Computer Sweden
NovaMedia AB
Vartavagen 55
S-115 38 Stockholm, Sweden
46-8-23 42 80

October 5-6
Compusource '83
Red Lion Inn
San Jose, California
Offers the OEM and the sophisticated end user a look at products and technology reflecting the latest advances in the computer industry. Features over 100 exhibits plus several technical sessions.
Norm DeNardi Enterprises
289 S. San Antonio Rd. #204
Los Altos, CA 94022
415/941-8440

October 6-9
The Microcomputer Fair
Long Beach Convention Center
Los Angeles
A show that has consumer orientation. Includes games, graphics, and programs.
Karen Bartnicki
CWCI
375 Cochituate Rd.
P.O. Box 880
Framingham, MA 01701
617/879-0700

October 8-10
PC '83/East
Bayside Exposition Center
Boston
Features IBM PCs and compatibles. The conference program includes PC applications, technical information, and general sessions showing users how to get the most out of their PCs.
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 02167
800/841-7000

October 10-14
Defense Computers-Graphics '83
Washington Convention Center
Washington, D.C.
International conference and exposition focusing on the use of computers/graphics for all facets of defense applications. Includes CAD/CAM training and simulation.
World Computer Graphics Association
2033 M St. NW #333
Washington, DC 20036
202/775-9556

(continues)

Get InShape!™



The personal diet and exercise program for IBM-PC users.

No matter what your fitness formula is, InShape™ and your IBM-PC can help take the work out of tracking your diet and exercise habits. Whether your racket is tennis or you're keeping tabs on the dinner table, InShape helps you measure your progress on the road to personal fitness.

The Waist Watcher

Keeping accurate daily records of what you eat is important, regardless of whether you're dieting or simply concerned about proper nutrition. InShape makes it easy. InShape's computerized food dictionary lists approximately 1,000 different foods, along with their food group and calorie, carbohydrate, protein, and fat content. The food dictionary can easily be edited and new foods added.

To update your daily record, simply select the food from the dictionary, then specify the number of servings and the meal — breakfast, lunch, supper, or snack. Over 50 entries per day can be recorded. InShape automatically totals your daily consumption by meal and food group.

And when it comes to exercise...

Of course, InShape can't do your exercising for you. But it *can* make getting started and staying with it a lot more fun.

Using the standard aerobics formulas, InShape automatically calculates points for 24 aerobic activities — from running to racquetball. Merely enter information pertinent to each exercise performed. InShape figures the points you've earned and keeps track of your weekly total.

Spotting trends

With InShape, you can *see* exercise and eating patterns over a period of time. Flexible plotting capabilities let you display up to a year's worth of information and view it on a daily or weekly basis. InShape can show you such detailed information as calories consumed compared to aerobic points, percentage of protein eaten at each meal, carbohydrates consumed by food group, and much more.

The main ingredient — you

Once you've set your diet and fitness goals, InShape helps you pinpoint problem areas. And helps measure your progress as you build a computerized personal fitness and nutrition profile. All you need is willpower. And the desire to get in shape!

For the introductory price of $95, *you* can get InShape. For more information write DEG Software; 11999 Katy Freeway, Suite 150; Houston, Texas 77079; 713/531-6100. To order, call 800/231-0627 (continental United States, excluding Texas).

DEG software

11999 Katy Freeway, Suite 150
Houston, Texas 77079
713/531-6100, 800/231-0627

Available at participating retail stores.
Dealer inquiries welcome.

Requires IBM-PC, minimum one disk drive, and 80-column monitor. Printer optional. Compatible with DOS 1.0 and 1.1 with 64K memory, or DOS 2.0 with 96K memory and double-sided disk drive.

Reader Service #314

MicroScript™ $99

State of the Art Text Formatter

- extensible generic markup
- multiline headers, footers, and footnotes
- automatic widow and orphan suppression
- automatic section numbering
- automatic bullet, number, and definition lists
- floating and inline figures
- left, center, right, or justify text alignment
- left and right indention with delay and duration
- bold, underscore, and proportional spacing
- macros and symbols
- multiple input files of unlimited size
- direct printer control
- format preview
- IDS, Qume, Diablo, NEC, C.ITOH, and all TTY
- table of contents, index (16 bit only)
- multiple columns (16 bit only)
- conditional processing (16 bit only)

MicroEd™ $49

Customizable Full Screen Editor

- full cursor control by character, word, or line
- position to top or bottom of window or file
- scroll by line, half window, or full window
- global or selective find and replace
- delete by character, word, line, or block
- read external files into current file
- copy, move, and write blocks of text
- insert, overlay, or wordwrap text
- all cursor addressable VDTs

Postpaid within U.S. & Canada. outside U.S. add $10. CA residents add 6%.
MC/VISA OK. 8" SS/SD CP/M-80*, and CP/M-86* 5.25" SS/DD PC-DOS

MicroType™

6531 Crown Blvd., Suite 3A, San Jose, CA 95120
(408) 997-5026

* CP/M-80, CP/M-86 are trademarks of Digital Research. PC-DOS is a trademark of IBM Corporation.

Reader Service #369

$$ WE WILL NOT BE UNDERSOLD $$

EPSON
RX 80, MX 80 FT III, MX 100, FX 80 and newest FX 100 **"lowest prices in USA"**

PRINTERS

C. Itoh 8510 Prowriter (P)	$385.00
C. Itoh 1550 Prowriter (P)	679.00
Gemini 10X	329.00
Gemini 15	499.00
Okidata 82A	419.00
Okidata 83A	649.00
Okidata 92	520.00
Okidata 93	869.00
Smith Corona TPI	549.00
Brother HR 1	CALL
Brother HR 15	CALL

MODEMS

Hayes 300 B	209.00
Hayes Smartmodem 300/1200	485.00
Hayes Smartmodem 1200 B	479.00
Hayes Smartmodem Com/soft	114.50

DRIVES

Tandon Tab 1800 DSDD	$284.50
Tandon TM50-2 slim DSDD	298.50
Teac ½" FD 55 DSDD	298.50

MEMORY I/O BOARDS

AST Megaplus 64K (c,s)	337.95
AST Megaplus 64K (c,2-s)	378.95
AST Megaplus 64K (c,s,p)	378.95
AST Megapac (256K-512K)	636.95
Combo Plus (c,2-s,1-p)	314.95
I/O Plus (c,2-s,1-p)	294.50

ALL OTHER CARDS AVAILABLE CALL

SOFTWARE SPECIALS

Lotus 1,2,3	350.00
Multiplan	175.00

DISKETTES

Elephant DSDD	28.50
Microsoft Mouse	CALL

3% Charge Cards, 3% ship. Prices subject to change.

THE COMPUTER STORE
Dept. 345, 3941 B South Bristol St., Santa Ana, CA 92704
(714) 261-1383

Reader Service #377

Engineering Software

for your PC

- *Power plant and chemical process flowsheet analysis*
- *Pressure drops in pipes and fittings*
- *Thermodynamics of steam, air, fuels, combustion products*
- *Component simulation*
- *Solvers and optimizers*

Call or write for our free catalog

PSI/Systems

Research Park, P.O. Box 3100
Andover, MA 01810
(617) 475-9030

Reader Service #375

Contemporary ComputerWear

DUST COVERS FOR THE IBM PC



Attire your IBM PC in style! **ComputerWear** is dust protection with class. Design features include select, woven fabric and embroidered emblem. Order now. Satisfaction guaranteed.

☐ **YES,** PROTECT MY PC IN STYLE! SEND ME: ☐ CHECK
____ Keyboard(s) $16 ____ Monitor(s) $18 ☐ VISA
____ Drive(s) $18 ____ Printer(s) $18 ☐ MC
____ 1pc Mon/Drive $36 Add $2.00 Shipping Total: $_____
(CA Res. add tax)

Print Name: _____
Address: _____
City/State: _____ Zip_____
Credit Card #: _____ Exp._____
Signature: _____

Contemporary ComputerWear Att: YT
1320 36th Ave./San Francisco, CA 94122 • 415/564-0506
IBM PC is a trademark of International Business Machines Inc.

Reader Service #276

October 19-21
National Software Show
San Francisco Trade Show Center
San Francisco
A microcomputer software trade show. Features software, publications, franchises, magnetic media suppliers, and software supplies.
Paul Cunniffe
Raging Bear Productions, Inc.
21 Tamal Vista Dr. #175
Corte Madera, CA 94925
800/732-2300, 415/924-1194

October 27-30
Mid-Atlantic Computer Show & Office Equipment Exposition
Washington Convention Center
Washington, D.C.
Hardware and software for use in business, industry, government, education, and the home. Features minis, micros, data and word processing equipment, computer graphics, publications, and office systems. Includes telecommunications equipment, telemarketing, and business services.
D. Harris
Computer Expositions, Inc.
P. O. Box 3315
Annapolis, MD 21403
800/368-2066, 800/492-0192

Are you sponsoring an event for the computing community? Please let us know. Send details as far in advance as possible to World Events, PC World, *555 De Haro St., San Francisco, CA 94107, CompuServe: 74055,412. Source: STE908.*

MICROXPRESS

PERIPHERALS FOR THE IBM PC AND COMPATIBLE COMPUTERS



5-1/4" FULL HEIGHT INTERNAL MOUNTING FLEXIBLE DISK DRIVES FOR IBM PC & XT, ZENITH/HEATH* AND OTHER SMALL COMPUTERS

CONTROL DATA CORPORATION
CDC 9409 DOUBLE-SIDED, 48TPI, 320/360K8 — $ 245

Tandon
TM100-2 DOUBLE-SIDED, 48TPI, 320K8 — 235
TM101-4 DOUBLE-SIDED, 96TPI, 640K8 — 295

5-1/4" 1/2 HEIGHT INTERNAL MOUNTING FLEXIBLE DISK DRIVES (INCLUDES STRAP KITS TO MOUNT IN FULL HEIGHT FOOTPRINT) 6 MS STEP RATE

Tandon **TM50-2** DOUBLE-SIDED, 48TPI (2) DRIVES FOR 395
QUMETRAK 142 DOUBLE-SIDED, 48TPI (2) DRIVES FOR 425
TEAC **FD 55-B** DOUBLE-SIDED, 48TPI (2) DRIVES FOR 575
TEAC **FD 55-F** DOUBLE-SIDED, 96TPI (2) DRIVES FOR 750
IBM 4 DRIVE ADAPTOR CABLE — Call

8" THINLINE FLEXIBLE DISK SUBSYSTEM
(SHOWN ABOVE) FULLY ASSEMBLED & TESTED WITH COMPLETE DOCUMENTATION W/CABLE & SOFTWARE

I-8480 DUAL DRIVE, DOUBLE-SIDED, 2 4MB — 1,495
I-8481 SINGLE DRIVE, DOUBLE-SIDED, 1 2MB, INCL FILLER PANEL – SECOND DRIVE CAN BE ADDED LATER — 995
8" DISK CONTROLLER — 195
CPM & CPM 86 SOON AVAILABLE — Call

IBM PC DOS SOFTWARE UTILITIES FROM **TALL TREE SYSTEMS**

J FORMAT ENABLES USE OF 5-1/4", DS, 96TPI & 8" FLEXIBLE DISK DRIVES PLUS OTHER FEATURES FOR IBM PC DOS 1.10 VERSION 1.78 — 50
J FORMAT-2 SAME AS J FORMAT ABOVE FOR IBM PC DOS 2.0 — 35
WINDRIVE ENABLES USE OF WINCHESTER SUBSYSTEMS FOR IBM PC DOS 2.0 — 35
JETDRIVE ENABLES IMPLEMENTATION OF ELECTRONIC DISK FOR IBM PC DOS 2.0 — 35
J UTILITIES INCLUDES J FORMAT-2, WINDRIVE & JETDRIVE — 95

CONTROL DATA CORPORATION **DISKETTES** — Guaranteed Error Free

1242-00 5-1/4" SINGLE-SIDED, SINGLE/DOUBLE DENSITY, WRITE PROTECT NOTCH & HUB RING (Box of 10) Special 19.95
1244-00 5-1/4" DOUBLE-SIDED, SINGLE DOUBLE DENSITY, WPN & HUB RING (Box of 10) Special 29.95
— 8" SINGLE OR DOUBLE-SIDED, SINGLE/DOUBLE DENSITY, WPN & HUB RING VARIOUS FORMATS — Call

5-1/4" & 8" DISK CONTROLLERS

MAYNARD ELECTRONICS
FDC 5-1/4" FLOPPY DRIVE CONTROLLER — 175
FDC/P8 8" FLOPPY CONTROLLER — 195
SANDSTAR™ SERIES ALSO AVAILABLE — Call

MULTIFUNCTION & RAM CARDS

AST RESEARCH INC.
I/O PLUS
I/O-SPG W/CLOCK 1 SERIAL, 1 PAR PORT & GAME PORT — 240
COMBO PLUS
MC-064 SPC W/CLOCK, 1 SERIAL & PAR PORT WILL EXPAND TO 256K — 305
MEGA PLUS
MG-064 W/CLOCK & 1 SERIAL WILL EXPAND TO 512K — 305
MG-000S SERIAL OPTION FOR MEGA PLUS — 39
MG-000P PAR OPTION FOR MEGA PLUS — 39

QUADRUM CORP.
QUADBOARD W/CLOCK 1 SERIAL & 1 PAR PORT — Call
QUADBOARD II W/CLOCK II SERIAL & PAR PORT — Call

PERSYST INC.
TIME SPECTRUM 64K W/CLOCK & 1 SERIAL — 330
SERIAL PORT OPTION — 40
PAR PORT OPTION — 40
TIME PORT I/O CARD W/CLOCK 1 SERIAL & PAR PORT — 190
SERIAL OPTION — 40
PAR PORT OPTION — 40

BUSINESS APPLICATIONS SOFTWARE

ASTON TATE
D BASE II — 450

MICRO PRO
WORDSTAR — 309
MAILMERGE — 165
WORDSTAR/MAILMERGE — 387

LOTUS
1-2-3 — 385

PEACHTREE SOFTWARE
PEACH PAK (GL/AR/AP) — 386

VISICORP
VISICALC 256K — 194
VISITREND/VISIPLOT — 230
VISIWORD/VISISPELL — 510

MODEMS

HAYES MICRDCOMPUTER PRODUCTS
SMARTMODEM 300 — 235
SMARTMODEM 1200 — 550
SMARTMODEM 1200B — 475
COMMUNICATION SOFTWARE INCLUDED

COLOR GRAPHICS & GRAPHICS CARD

HERCULES	GRAPHICS CARD	395
USI	MULTIDISPLAY CARD/PAR PORT	349
AMDEK	MAI COLOR/GRAPHICS	475
PLANTRONICS	COLORPLUS/PAR PORT	400

MONITORS & GRAPHICS CARDS

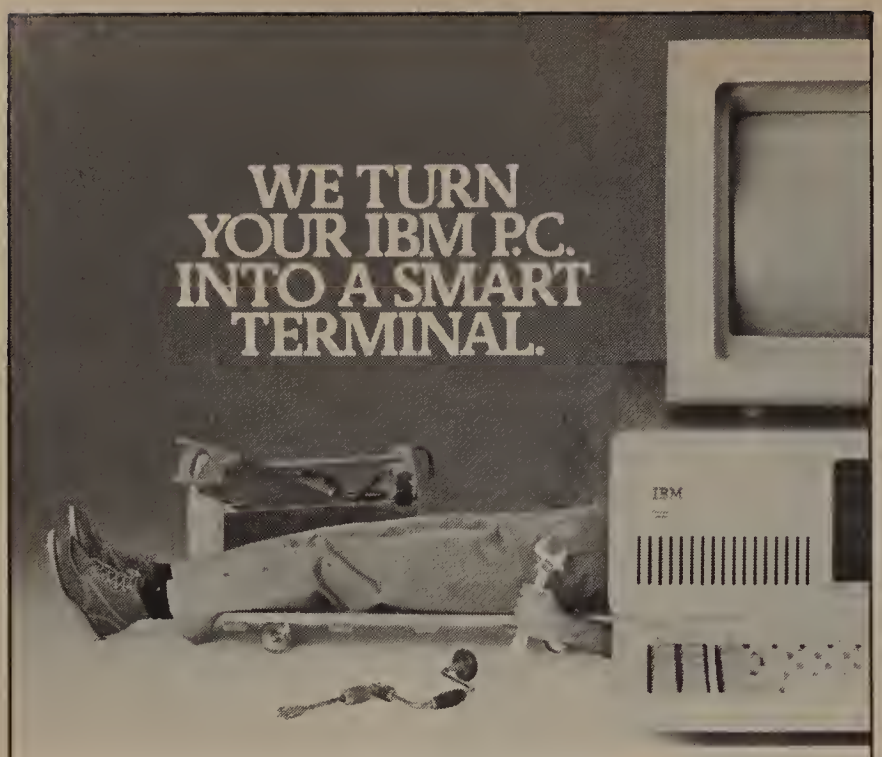
AMDEK		
VIDEO 300	12" HI-RES GREEN	149
VIDEO 310A	12" AMBER MONITOR	189
COLOR I	13" COMPOSITE COLOR	339
COLOR II	HI-RES RGB MONITOR	695
COLOR III	LOW-RES COLOR	429
NEC		
JC12030	12" HI-RES COLOR (RGB)	715
	CABLE FOR IBM-PC MONITOR	21
PGS		
HX-12	12" HI-RES COLOR (RGB)	565
USI		
P13	AMBER 12" MONITOR	160
1400C	12" COLOR MONITOR (RGB)	325
QUADRUM CORP		
CH 8400	12" COLOR MONITOR (RGB)	549

WE ALSO OFFER NETWORKING AND COMMUNICATION PRODUCTS FOR THE IBM PC AND COMPATIBLE COMPUTERS CALL FOR FURTHER INFORMATION

MICROXPRESS
(714) 632-8512
305 S. State College Blvd
Suite 135
Anaheim, CA 92806

VISA* MasterCard

Reader Service #235



You don't really need to get your hands dirty to turn your IBM PC into a DEC VT100 and VT52 compatible intelligent workstation. All you need is VTERM, Saturn Consulting Group's terminal emulation software. VTERM's features include full VT100 keyboard and video emulation, throughput to 9600 baud, printer support, and PC-Host file exchange, in addition to the standard capabilities of an asynchronous communications package. Call or write today. Our software mechanics are standing by.

SATURN CONSULTING GROUP INC.
147 West 26th Street, New York, N.Y. 10001
Call (212) 675-7753

Reader Service #166

MOST COPY PROGRAMS DO NOT WORK

ON PC COPY-PROTECTED SOFTWARE

We ran them by the top thirty and that's what we've discovered •••• especially on the games. So we have released

SafeCopy™

It does work

We're **Wizards** and we're out to transmogrify a PC industry that presumes trivial software copy-protect schemes are adequate. We hope that by putting **SafeCopy** on the market most companies will discontinue an annoying practice that never stopped **WIZARDS** ••• only parents from making back-up of a properly purchased game. Because **KIDS & MUNCHKINS** do mangle diskettes, honey, peanut butter and bend

SafeCopy is the safest way to backup your protected software.

List $99.95 U.S. **Introductory Offer $49.95 U.S.**

We accept cash certified cheque, Visa and Mastercharge. Ontario residents please add 7% sales tax. Add $3.00 for shipping & handling. For phone order call (416) 249-8601 or (416) 598-1777 or mail orders to

COMPUTER SHACK INC.
P.O. Box 190, Etobicoke, Ontario, M9C 4V3

SUNMAIL

THE BEST MAILING LIST PROGRAM FOR YOUR IBM-PC

- COMPLETELY MENU-DRIVEN
- HARD DISK COMPATIBLE
- OPERATES UNDER MS-DOS VERSIONS 1.0, 1.1, 2.0
- FEATURES INDEXED (ISAM) FILES — NO SORTING NEEDED
- INSTANT LOOK-UP & CORRECTION

NAME FIELD, BUSINESS NAME FIELD
ADDRESS, CITY, STATE, 9-DIGIT ZIP CODE
FOREIGN COUNTRIES TOO
2 DATE FIELDS
2 TELEPHONE NUMBERS W/AREA CODE FIELDS

★ EACH RECORD CAN BE CODED WITH AN **UNLIMITED** NUMBER OF CODES: YOUR IMAGINATION IS THE ONLY LIMITATION.

OUTPUT

★ SELECT BY **ANY** COMBINATION OF CODES AND ZIP CODE RANGES, IN ALPHABETIC OR ZIP CODE SEQUENCE.

1, 2, 3, 4 up MAILING LABELS
(132 col. printer required for 3 & 4 up)
CHESHIRE LABELS • DIRECTORIES
ENVELOPES • FORM LETTERS
Any type of forms or labels with any combination of selected SUNMAIL data.

$99.00
requires 96K RAM & 80-column printer

see SUNMAIL at your local computer store or software dealer or order direct

SUNWARD SYSTEMS, INC.
655 W. Irving Park Road #5203, Chicago, Illinois 60613
Check & COD orders accepted. All orders shipped in 48 hrs. via UPS.

Reader Service #183

SIMPLE Pleasures



Pleasures like easily accessing and modifying your accounting data files ... pleasures like communicating directly with your micro computer using a vocabulary of English words and phrases ... pleasures like easy "browsing" through any data file.

These are just a few of the benefits derived by users of the TCS™ SIMPLE Filing System. The system works with all modules of our TCS™ TOTAL ACCOUNTING SYSTEM, now available on MS-DOS, and ideal for hard disk applications.

TCS Software ... The Software for People Who Mean Business.

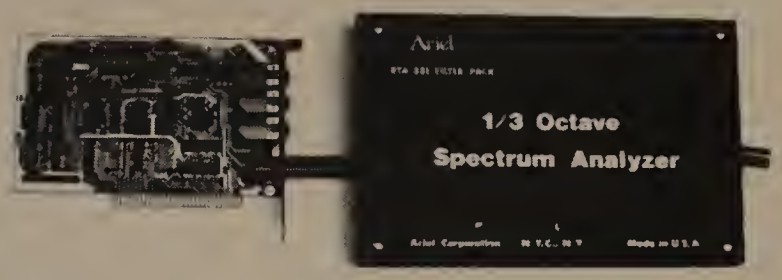
TCS S·O·F·T·W·A·R·E
3209 FONDREN ROAD • HOUSTON, TEXAS 77063 • 713/977-7505

HOME BANKING, INVESTMENTS, PERSONAL FINANCIAL MANAGEMENT AND INFORMATION.

A consumer research center is seeking New York area owners/users of personal computers to participate in a study on home delivery of financial services. This normally requires attending an interview/demonstration session in mid-Manhattan, for which you receive remuneration. Interested?

Call the Development and Learning Center at (212) 916-9400. Thanks!

RTA for PC



The Ariel RTA is a real time 1/3 octave spectrum analyzer for the IBM Personal Computer. Assembly language routines create an instantaneous display of the frequency spectrum of any audio signal. Also, the analyzer can digitize the signal and store it in the PC's memory for analysis or play back. Call or write for full specifications and applications.

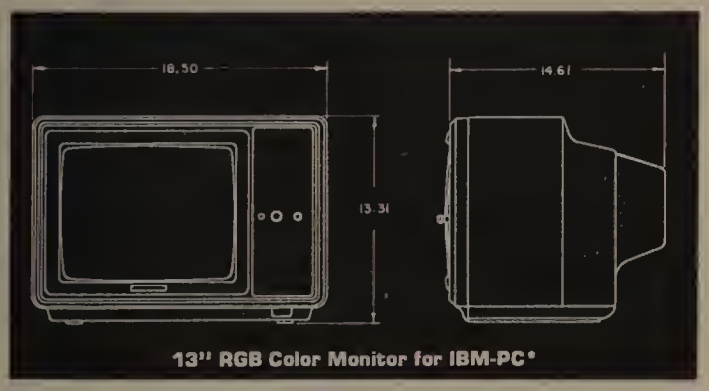
- 31 two pole filters on ISO centers.
- Pink noise source under software control.
- Averaging, weighting and peak hold functions.
- ¼ db resolution from 20 Hz. to 20 KHz.
- 8 bit real time analog input/output system.
- Price: $649.95 shipping included.

Ariel_

600 West 116th Street
New York City, N.Y.
10027
(212) 662-7324

Reader Service #13

ELECTROHOME RGB COLOR MONITOR BUY DIRECT AT $399.00



- ECM 1302-3
- Ready to plug in
- 580 x 235 pixels
- 10 MHz
- 80 characters x 25 lines
- No adaptor needed
- 1 year factory warranty on parts and labor

Dealer Inquiries Welcome
NJ residents add 6% sales tax.
Add $15.00 shipping/handling/insurance for UPS.
Areas not serviced by UPS freight collect.

*IBM is a trademark of IBM Corp.

avtec Industries, Inc.
39 Industrial Avenue
Teterboro, NJ 07608
201 288-6130 212 608-0509

Reader Service #390

Time Accountant

MANAGEMENT TOOL FOR PROFESSIONALS

Where does the time go? And who's paying for it? Time Accountant[1] and your IBM Personal Computer[2] answer these questions with hard facts.

Complete system. Each professional uses a handy pocket calendar/time sheet to record time and expense information. Then it's easy to enter data on a specially formatted computer screen.

Reports. Time Accountant provides the reports you need to analyze your firm's performance by professional, client or project.

Invoice. Time Accountant generates a draft invoice and you enter any necessary adjustments.

Flexibility. Whether you bill for two professionals or two dozen, Time Accountant adapts to your business.

■ **Time Accountant**
1230 University Drive
Menlo Park, CA 94025
(415) 328-7877

1 ® Software Quality Associates. 2 ® IBM Corporation.

Reader Service #277

WATSOFTPRODUCTSINC

A subsidiary of the University of Waterloo

Announces

a full screen editor and a family of language interpreters for the IBM Personal Computer

APL
BASIC
COBOL
EDITOR
FORTRAN
PASCAL

For further information contact:

WATSOFT Products Inc.
158 University Ave.
Waterloo, Ontario
N2L 3E9

(519) 886-3700
Telex No.: 06-955458

Reader Service #197

DISK MECHANIC T.M.

C

The ULTIMATE Backup, Analyze & Repair Utility
The Disk Toolkit NO IBM PC Should be Without
Protects Your Software Investment

BACKUP TOOLS:
- Can Backup Most Protected Disks
- SUCCEEDS where others fail!
- Works Manually or Automatically
- Create "Protected" Diskettes
- Many Additional Analysis Tools

FILE TOOLS:
- Show Disk & File Allocation
- Display & Alter File Data
- Repair Damaged Disks
- Recover Erased Files
- Alter "Hidden" Status
- Search Files For Data

SECTOR TOOLS:
- Examine/Print Sector Data
- Modify (ZAP) Sector Data
- Compare, Copy & Zero Sectors
- Search Sectors For Data

HACKER TOOLS:
- Modify Floppy Disk Controller Parameters
- Supports FDC R/W Commands

DISK MECHANIC works with all standard IBM PC disk formats including "protected" diskettes with mixed track and sector sizes, blank and high track formatting, CRC errors, and single or double sided drives. DISK MECHANIC requires an IBM PC with 128K of memory or COMPAQ with 192K of memory, DOS 1.10, and 2 floppy disk drives. DISK MECHANIC includes a detailed 48 page instruction manual. To Order DISK MECHANIC send check or money order for $70 plus $3 for shipping (Mass. res. add sales tax.) to: MLI MICROSYSTEMS, Box 825, Framingham, Mass. 01701 or Call (617) 926-2055 for Mastercard or VISA orders. Dealer/Distributor inquiries welcome. ©1983 MLI MICROSYSTEMS.

MLI MICROSYSTEMS

Reader Service #238

SIMPLE Pleasures



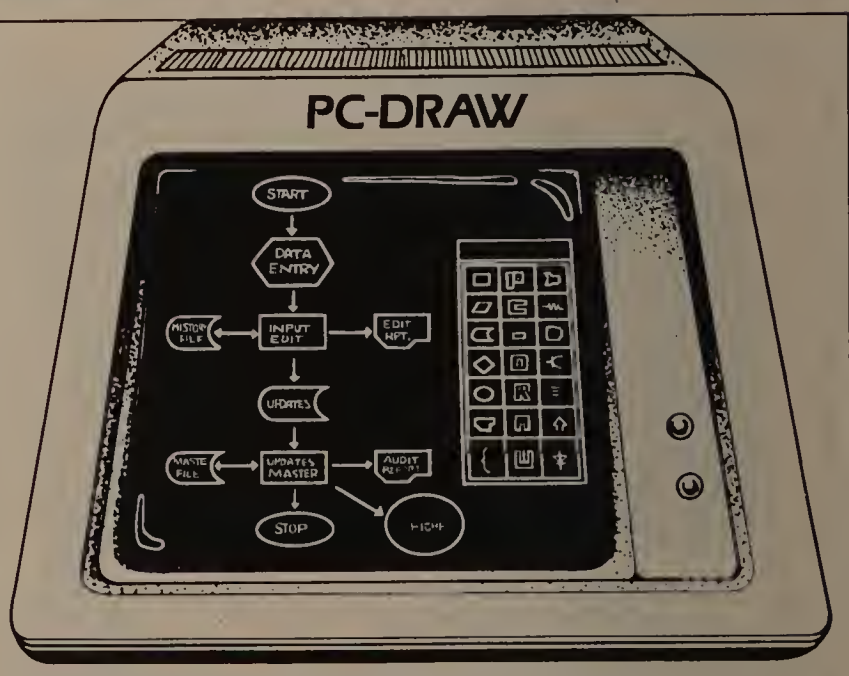
Pleasures like easily accessing and modifying your accounting data files ... pleasures like communicating directly with your micro computer using a vocabulary of English words and phrases ... pleasures like easy "browsing" through any data file.

These are just a few of the benefits derived by users of the TCS™ SIMPLE Filing System. The system works with all modules of our TCS™ TOTAL ACCOUNTING SYSTEM, now available on MS-DOS, and ideal for hard disk applications.

TCS Software ... The Software for People Who Mean Business.

TCS S·O·F·T·W·A·R·E
3209 FONDREN ROAD • HOUSTON, TEXAS 77063 • 713/977-7505

342 Reader Service #394



FAST, FLEXIBLE DRAWING with your IBM PC

Eliminate costly and time-consuming preparation/revision of flowcharts and other business documentation. With PC-Draw's unique capabilities, you have unlimited flexibility to create, maintain and print drawings, including user-defined symbol menus. Predefined flowcharting and electrical design menus are provided to get you started. **List price $250.**
The following minimum configuration is required:
- 96K • Color Graphics Adapter
- Epson or IBM printer with Graftrax

An optional light pen is also supported.

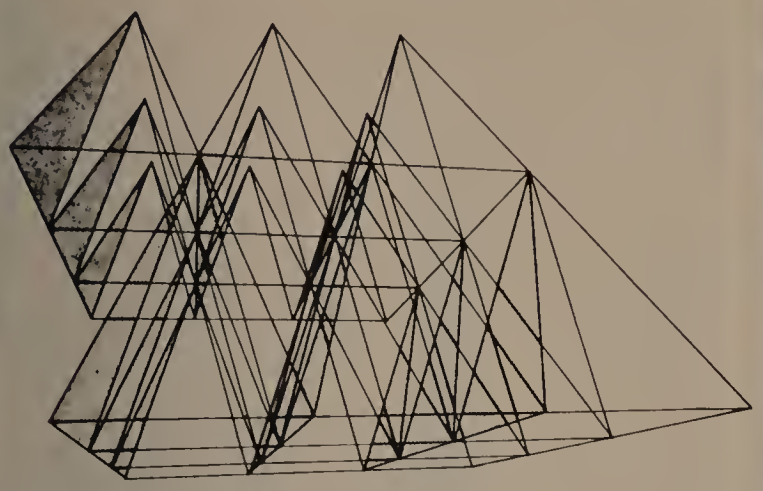
Visa and Mastercard accepted.

MICROGRAFX

8526 Vista View, Dallas, Texas 75243 (214)343-4338

Reader Service #332

Design it with MicroCAD™...



MicroCAD™

...a 3-dimensional graphics system

developed by an Architect/Engineer
for the IBM - PC

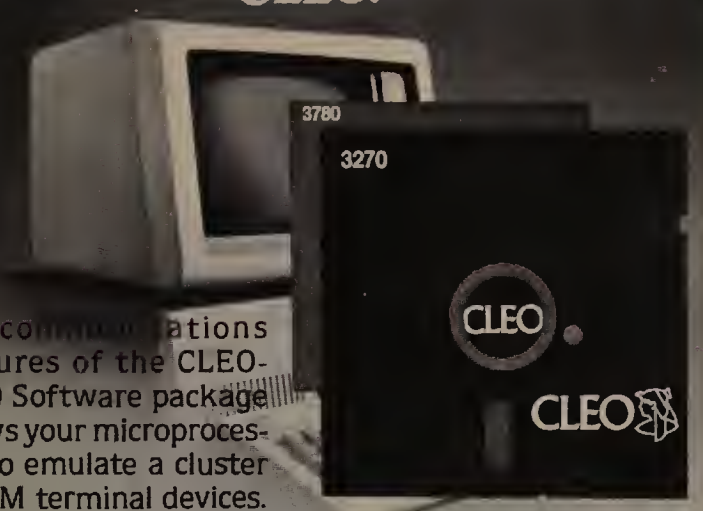
Construct, rotate, append, move, edit, and view objects in isometric or perspective. Build a collection of 3-D images and recall them in any combination. Supports the HP 7470A plotter and Epson MX 100 or MX 80FT printer.

only $ 500

For information, write: MicroCAD™
764 24th Avenue - San Francisco, CA 94121
(415) 387-0263 (415) 386-7881

Reader Service # 39

How can your microcomputer talk to an IBM mainframe? CLEO.



The communications features of the CLEO-3270 Software package allows your microprocessor to emulate a cluster of IBM terminal devices. The CLEO software provides the cluster emulation and makes the ASCII devices look like an IBM 3278 CRT and 3287 printer.

If your IBM mainframe doesn't support remote 3270 clusters, you need remote batch communications. CLEO-3780 Software is your answer.

For full details contact Phone 1, Inc., 461 North Mulford Road, Rockford, IL 61107; phone (815) 397-8110.

CLEO™

Reader Service #316

OUR ISOLATORS FOR YOUR PROTECTION

Prevents:

disk drive woes, printer interaction, memory loss and damage due to lightning or AC power line disturbances.



Commercial Grade Isolators	
ISO-1 3 Isolated Sockets	$76.95
ISO-2 2 Isolated Socket Banks, 6 Sockets	76.95
Industrial Grade Isolators	
ISO-3 3 Double Isolated Sockets	115.95
ISO-11 2 Double Isolated Banks, 6 Sockets	115.95
Laboratory Grade Isolators	
ISO-17 4 Quad Isolated Sockets	200.95
ISO-18 2 Quad Isolated Banks, 6 Sockets	169.95
Circuit Breaker, any model (Add-CB)	Add 10.00
Remote Switch, any model (Add-RS)	Add 18.00

ESP® Electronic Specialists, Inc.
171 South Main Street, Box 389, Natick, Massachusetts 01760

Toll Free Order Desk 1-800-225-4876
MasterCard, VISA, American Express

PC World Reader Service #66

WATSOFTPRODUCTSINC

A subsidiary of the University of Waterloo

Announces

Waterloo NetWorkStation Tools

for the IBM Personal Computer

Editor

- full-screen
- colour support
- function keys

Host Communications

- VM/370 CMS, RSTS/E, VAX/VMS
- file transfer micro to/from host
- access host files from micro programs

Terminal Emulation

For further information contact:

WATSOFT Products Inc.
158 University Ave W.,
Waterloo, Ontario
N2L 3E9

(519) 886-3700
Telex No 06-955458

Reader Service #197

DISCOUNT DISK DRIVES

PMC TFD-42 D/S THINLINE 5¼"	$225
TANDON 100-2 D/S 48TPI	$245
TANDON 100-4 D/S 96 TPI	$319
TEAC ½ HEIGHT	
D/S 40 TRACK	CALL
D/S 80 TRACK	CALL
QUADRAM QUADLINK	$578
QUADBOARD II 256K	$505

ALL QUADRAM PRODUCTS DISCOUNTED

WHOLESALE SUPPLIERS

VISA 408-373-0320 master charge

Reader Service #252

ANNOUNCING PCINPUT

INTELLIGENT KEYBOARD INPUT ROUTINE FOR IBM PC BASIC PROGRAMMERS

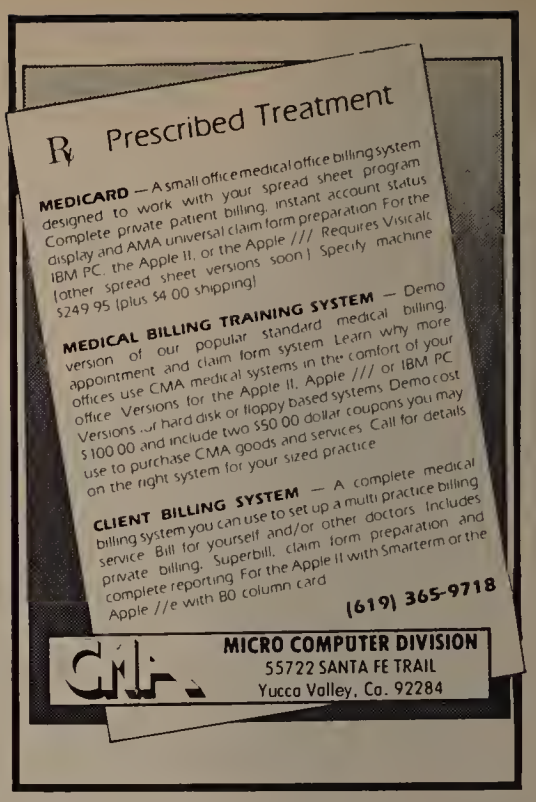
- User-Defined Edits
- Keyword Edits
- Range-Checking
- Invisible Fields
- Mandatory Fields
- Enable/Disable Escape
- On Key Goto
- On Key Gosub
- Automatically Converts Numeric Fields Into MKI$, MKS$, MKD$ Format

PC INPUT MANUAL ONLY	$10.00
PC INPUT DISK ONLY	$29.95
PC INPUT DISK & MANUAL	$39.95

COD ORDERS ADD $3.00
ALLOW 7-10 DAYS FOR DELIVERY
OHIO RESIDENTS ADD 5% SALES TAX

STATON ASSOCIATES
17 Franklin Avenue Shelby, OH 44875
(419) 347-3209

Reader Service #400



Reader Service #32

8087 SUPPORT

8087-3 NDP $223
IBM 8087 Runtime Libraries for MACRO, BASIC, PASCAL, or FORTRAN .....ea. $150
FASTPAK™ - 8087 chip, 87/88GUIDE, one library. . $375

COMPILERS:

87FORTRAN/RTOS™ $1350
87PASCAL/RTOS™ $1350
RTOS™ - Real Time Operating System $600
Supersoft Fortran..... $340
8087 Support..... $50
Microsoft Fortran/Pascal... ea. $340
Lattice C $450

Micro Ware
P.O. Box 79
Kingston, MA
02364
(617) 746-7341
You Can Talk To Us!

Reader Service #118

ANTISTATIC

P.C. DUST COVER SET

ONLY $19.95

- One cover designed to fit over the IBM monitor and P.C., a second cover for the keyboard
- Protects P.C. from adverse effects of contaminates, thus saving you cost of repair and lost data associated with this problem.
- Custom fit, all stitched seams, heavy gauge vinyl
- Satisfaction guaranteed. Return within 30 days for 100% refund.
- For MasterCard and Visa orders only, call Toll Free 1-800-531-3122, Operator 27. In Washington State, call 1-800-227-7800, Operator 27.

IN STOCK FOR IMMEDIATE DELIVERY

Send Check or Money Order to:
P.C.A.
16625 Redmond Way, Suite 107
Redmond, WA 98052 • **(206) 882-0385**
ORDER TODAY
Washington residents add 7.8% sales tax
Dealer inquiries welcome
Prices may increase without notice

Reader Service #336

IBM PC

$1999

Includes: 64K, 1-disk and color board!
Add 2nd disk, Amber Monitor, C. Itoh 8510 Printer w/int card, cable....$919

NEW!!

LNW Bus Board for the PC.....$129.95
Add up to 8 modules: Auto-Dial Modem, 8" Disks, RAM, CP/M-80, Clock, RS-232

Call for our CATALOG of PC Products
EXCELLONIX
(213) 650-5754 - (714) 973-1939

Reader Service #339

DISKETTES
Highest Quality Lifetime Guarantee

"New Product Release"

ULTRA-Magnetics This is a premium quality product designed for applications that require absolute reliability and error free performance. Each diskette is individually tested and complies with or surpasses all industry specs.

51/4" SSDD Soft sector w/hub rings $1.79
51/4" DSDD Soft sector w/hub rings 2.79

- Full line of ULTRA-Magnetics diskettes available including 8" and quad density.

ESKEI This diskette is rapidly establishing a name for itself as a quality product available at very attractive prices. Tested and certified to meet all standards of performance and reliability.

51/4" SSDD Soft sector w/hub rings $1.69
51/4" DSDD Soft sector w/hub rings 2.59

- Prices quoted are for quantities of 100. Please add 10% for smaller orders.
- Volume discounts available to qualified buyers.

Checks, Money Order, Visa, MasterCard— C.O.D. California Residents add 6 1/2% sales tax.

TOLL FREE
(800) 982-2244

Vidiom Media Supply
500 Airport Boulevard, Suite 422
Burlingame, California 94010, (415) 342-0663

Reader Service #327

Get a PC of the Action With a *PC World* Action Ad!

This could be your ad!

Now you can place a low-cost, high-response ad in *PC World*.

Get your product the special rate and special attention it deserves.

Call your *PC World* Advertising Rep now and ask for your *"Action Ad."*

Toll-Free 800/872-7800 (in CA call 800/872-7808)

Advertise in *PC World's* Action Space Where the Action Never Stops.

MasterPC Theater!



Announcing an exciting new 30-minute weekly television series coming this fall...

"Window on PC World"

Presenting an Inside Look at the World of the IBM Personal Computer and Compatibles–Latest Applications, Software, Hardware, Hands-On Reviews, and *much* more...

Brought to your home by PC World Magazine and Chesney Communications

Hosted by Robert Chesney ("Window on Wall Street")

Watch for our first episode, "Inside PC World," which will take you behind the scenes at PC World Magazine and the entire personal computer industry.

To be aired this fall in San Francisco, New York, Los Angeles, and Denver on a combination of cable, UHF, VHF, and PBS stations. Check your local TV listings for details.

For further details contact:

Noreen Browning, PC World Magazine,
555 De Haro Street, San Francisco, Ca. 94107
415/861-3861

PC World Directory

PC World Directory *is a comprehensive listing, by category, of products and services for the IBM PC, lookalikes, and compatibles. It provides rapid access to the burgeoning PC marketplace for both readers and advertisers.*

FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and company name, address, and telephone number.

Advertisers may choose among categories already being used or may create their own. Display advertisers can cross-reference their current ad to the PC World Directory *for increased exposure at low cost.*

RATES: Listings are accepted for 3-time consecutive insertions at a rate of $300 ($100 per issue). We are now offering a 6x insertion, 10% discount contract for a total of $540. Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, VISA, and MasterCard are acceptable.

DEADLINE: For space reservation deadlines, contact a PC World Directory *sales representative at 415/861-3861. Please send copy and prepayment to:* PC World Directory, *555 De Haro Street, San Francisco, CA 94107.*

See you next issue!

Accessories

Cases

Aluminum Computer ¢ases
Our epoxy bonded aluminum construction offers strength, utility, and peace of mind. Get the protection you need against transport hazards from the ¢ase experts! Three sizes offered, foam pads/blocks included. *P¢ase, Inc., 60B Orville Dr., Bohemia, NY 11716, 800/231-CASE*

Computer Covers

B.L.& W. Dust Covers
Custom fit monogramable design in durable, attractive, washable poly/cotton will not crack or dry out and allows ventilation. Colors-cranberry/navy/pewter/sand. IBM PC 1pc or 2pc-$19; kybd only-$14; Prnts-$16. Other makes/models avail. Visa/MC accepted. 7-10 day delivery; toll free ordering. *B.L.& W., Box 381076, Germantown, TN 38183, 800/821-7709, 901/754-4465*

Computer Cozies
Custom-made, quilted dustcovers - anti-static, machine washable. Offered in 6 colors: grey, chocolate, cream, navy, burgundy, or rust. Any cover can be made-to-order. Sys/Mon(1 or 2 pc) & kybd: $50 per set. Narrow Print: $20. Wide Print: $24. Ind. unit prices available. Send for more info. *Covers A Lot, P.O. Box 369, La Honda, CA 94020, 415/747-0352*

Jewelry

Computer Jewelry
Signifying professional involvement in the microcomputer industry. Unique designer pieces are perfect for gifts, awards, or premiums. Lapel pins, tie tacks, and stick pins in 18K gold vermeil ($12) or sterling silver ($10). Satisfaction is guaranteed, or your moneyback. (See display ad this issue.) *MC/N, Computer Jewelry, Simms Center, Box 9393, San Rafael, CA 94912, 415/453-7033*

MC/N, Inc.
COMPUTER JEWELRY

Supplies

Tab Dividers
For DOS and BASIC manuals. Divide manuals into sections. Insert 31 pages for BASIC, 21 for DOS 1.1, 13 to upgrade to DOS 2.0. Each divider is 100 lb. cardstock w/mylar holes and tabs. Tabs printed 2 sides. $9.95 for DOS 1.1 or BASIC (ALL VERSIONS), $7.95 for DOS 2.0 upgrade. MONEY BACK guarantee. DISCOUNTS for 3+ sets. *Televox International, 66 Heather Lane #2164, Orinda, CA 94563*

Continuous Computer Forms
Over 350 computer forms including checks, statements, invoices, purchase orders, tax forms, and letterhead. Forms designed for Peachtree Series 8,40,4,5,BPI, open systems, MBSI, State of the Art, Accounting Plus, Great Plains, Continental, Fedder, and Structured Systems. 24 hour shipment on blank stock. *Checks To-Go, 8384 Hercules St., La Mesa, CA 92041, 800/854-2750 (Nat), 800/552-8817 (CA), or 619/460-4975*

Checks To-Go

Consultants

Alaska

Construction Management
Construction Mgmt. Consultant doing Custom Applications Programs and Software by the MIDNIGHT SUN
* Estimating - $300.
* Jobcosting - $500.
* Parts Inventory - $500.
Networking/Misc. Plotters/CPM Schedule/Cadcam/ & MORE! ——-Demos are available. *Rambow Enterprises, 7-480 A "I" St., Elmendorf AFB, AK 99506, 907/753-2291*

RAMBOW ENTERPRISES

California

dBASE II Consultants
Fixed Price Reports from dBASE II.
• We send you a questionnaire.
• You describe your report needs.
• We give you a fixed price quote!
Specialists in order entry, repair tracking, mailing lists. *David Jenkins & Associates, 1609 Bancroft Way, Berkeley, CA 94703, 415/644-2369*

IBM PC Consulting
We provide the high quality of service demanded by the business community. Our services include: system integration, on-site training, custom programming in dBASE II & other languages, and complete technical support. We also carry a full line of hardware and software at discount prices. *Balo Computer Services, 4333 Price St., Los Angeles, CA 90027, 213/665-4677*

Manual Aversion?
Learn computing one-on-one at your own speed from friendly training specialists. Use your computer or ours. Also, keyboard enhancement and customization of WordStar™ and other software. See our article, "WordStar™ Made to Order," in issue #2. *Computer Hand Holding™, 1800 Market St. #91, San Francisco, CA 94102, 415/561-9189*



PC Accounting Applications
If you are putting any of your accounting onto your PC or XT, you will find our services invaluable. We can aid in the software selection and implementation; these require both computer and accounting expertise, despite what the ads say. See some of our software evaluations in the February PC Magazine. *Knight & Company, CPA, 6644 Heartwood Dr., Oakland, CA 94611, 415/339-9036*

Sherry Knight

Diskettes

No-Flop Floppy
100% certified AND guaranteed diskettes. Box of 10 soft sector, 5 1/4 inch, reinforced hub. To keep cost down, mail order only.
MEMOREX SSDD $27.00 DSDD $37.00
MAXELL SSDD $29.00 DSDD $40.00
No EXTRA CHARGE! CA residents add 6.5% sales tax. Please send check or M.O. to: *Ramsys, 225 W. Broadway # 500, Glendale, CA 91204, 213/240-9521*

Elephant Memory Systems
Quality diskettes are available in all popular 5¼" and 8" models and custom formats. They're guaranteed to meet or beat every industry standard for quality. They come standard with reinforced hub rings and they sell at some of the lowest prices in the business. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

Diskette Copy Service

Reliable Copy Service
Duplication & formatting done by state-of-the-art high speed duplicating equipment for IBM, Apple, Atari, TRS-80, Commodore, and many more. Copy protection & surrealization schemes available with custom printing and packaging. All this exceeds ANSI specifications. Fast turn around guaranteed. *OMNI Resources Corp., 50 Howe Ave., Millbury, MA 01527, Nat. 800/343-7620, 617/865-4451*

Superior Diskette Copying
Lifetime guaranteed duplicating for most systems and formats using sophisticated reliable equipment. Serialization, copy protection (encryption), and packaging available. Double boot for Apple and TRS. Supplied on OEM Allenbach diskettes. Rapid delivery for 100 to 100K copies. *Allenbach Industries, Inc., 2101 Las Palmas, Ste. A, Carlsbad, CA 92008, 800/854-1515, 619/438-2258*

ALLENBACH
INDUSTRIES INC

Education

Learning the Keyboard
Learn to type in 10 hours with this amazing, timely course which consists of 2 one-hour audio cassettes, learning aids & a practice booklet—all prepared by a college typewriting instructor. End your "hunt & peck" typing and start to use your computer efficiently. $9.95. *Skills Update, P.O. Box 6024, Silver Spring, MD 20906, 301/598-5740*

PC Training for Business
New York City Area. Hands-on training in LOTUS 1-2-3, dBase II, WordStar, VisiCalc, BASIC, and An Introduction to the IBM/PC. Demonstrations and consultations. Our site or yours. Call for corporate training information. *Summit Micro Computer Learning Center, 436 Springfield Ave., Summit, NJ 07901, 201/277-3837*

Hardware

Add-On Boards

AST/Maynard/Quadram
AST ComboPlus (SPC, 64K) $269. AST MegaPlus (SC, 64K) $269. AST I/O Plus (SC) $114. Extra Parallel, 2nd Serial or game, $35. MAYNARD Disk Controller $155 - with PP add $50, SP add $70. QUADRAM Quadboard or Quadboard II $289. Set of nine 64k, 200ns chips $55. *VLM Computer Electronics, 10 Park Pl., Morristown, NJ 07960, 201/267-3268*

256K of No Slot Memory
Let us install up to 256K RAM on your EXISTING SYSTEM BOARD using NO SLOTS. We improve your IBM-PC so it can address the 64K ram chips. 128K-$192, 192K-$256, 256K-$320 (expandable & warranted). DO-IT-YOURSELF KITS PC-KNB-$39.95 & PC-KPC-$59.95; 64K-PUR-($5.59 each) 64K RAM chips. *Add-MEM, 22151 Redwood Rd.,Castro Valley, CA 94546, 415/886-5443*

Add-MEM

13 Function EASIBOARD™
IBM quality plus Easitech Excellence exclusively at IBM PC dealers worldwide. Memory (64K-256K), spooler, printer and modem connections, three electronic disk, chronograph and more! No need to search for low prices. Our lowest prices are at authorized IBM PC dealers only. $325 to $595. Easiboard by Easitech. *Easitech Corporation, 2215 Perimeter Park #22, Atlanta, GA 30341, 404/452-7576*

EASITECH
CORPORATION

Quadboards & Quadram Products
256K Quadboard $465 delivered!
Codaram Corp. has all QUADRAM Products at mail order prices. All products carry the QUADRAM warranties and can be used for any special offers from QUADRAM. We will meet or beat any advertised prices. Call or write for a complete price list. *Codaram Corp., P.O. Box 1054, Lilburn, GA 30247, 404/925-0640*

Voice Synthesizer-Game Adapt
The voice synthesis board allows your IBM PC to speak. Over 300 words of vocabulary on board with external expansion. Each board comes with a software support disk to make it easy to use in your system. Game adapter included. List price $249. VISA/MC. *Glenco Engineering, 915 E. Carpenter, Palatine, IL 60067, 312/537-4200*

Memory and Software and . . .
MTI memory cards. All are expandable (with 64K installed) and come with a 12 month warranty. 192K, $160. 256K, $180. 512K, $275. 256K versa-card (2 serial 1 parallel) $400. QNX multi-user multi-tasking operating system with C compiler, $575. No charge UPS on prepaid orders. NY residents add tax. *Strawberry Software, 769 Arnow Ave., Ste. 2A, Bronx, NY 10467, 212/547-9446*

USI MultiDisplay Card
The USI MultiDisplay card combines the functions of both the IBM Monochrome and Color/Graphics Display Adaptors and includes a parallel printer adaptor. Fits the IBM PC and XT Computers. Features flicker-free scrolling and external mode select switch. Suggested retail $449. *USI International, 71 Park Lane, Brisbane, CA 94005, 415/468-4900*

Multi-Fcn Bds IBM PC/XT
• APSTEK Multi-FCN BDS Full 256K + Pty + 6' Cable + Diagnostic $429
• Profit SYS ADDRAM BDS Full 512K + Pty + N/Cad Bty + Tascmaster $679
• ALL BOARDS INCLUDE: Ser RS232 + Par Prt I/O Real Time/Date Clock Ram/Splr Dsk + 1 Yr Wty
9-64K RAM Kit (200ns) $49
Call or send check/MO to: *Electro-Vu Computer, Inc., 15718 Manhattan Pl., Gardena, CA 90247, 213/532-4878*

Stop Waiting!
Your IBM PC will come on in 3-4 sec. or less with QUICKON, NO MATTER HOW MUCH MEMORY YOU HAVE! Easy plug-in installation; no Expansion Slot needed and no soldering required. Works in all IBM PCs EXCEPT the XT. QUICKON is only $49, postpaid (Introductory offer) NY buyers add $4.05 tax. *Security Microsystems, 16 Flagg Pl., #102W, Staten Island, NY 10304, 212/667-1019*

256K User Expandable Memory
64K-256B User Expandable (Socketed) Parity Memory, Precision Delay, Line Timing, Switch Selectable Start Address on 64K Boundries anywhere in 1MB Address Space, Hold-Down Bracket and Card Guide. 1 Year Warranty.
MEM000-$105,
MEM064-$147,
MEM128-$201,
MEM192-$255,
MEM256-$299. *Ontrax, Inc., P.O. Box 368, Oakhurst, NJ 07755, 201/244-2302*

Computers

IBM PC/Columbia MPC/ LNW
IBM PC just $1999 includes 1-disk, color board, 64K. Add 2nd disk, C.Itoh 8510 Printer w/int card, cable, and Amber Monitor for $919. COLUMBIA MPC $3395 with a free RGB Color monitor. NEW LNW ADD ON MODULES!! CALL for our new catalog of IBM PC boards and peripherals. *Excellonix, 7180 Woodrow Wilson Dr., Los Angeles, CA 90068, 213/650-5754, 714/973-1939*

EXCELLONIX

Computer Graphics

Professional Color Workstations
High-resolution color graphics systems. Convert the IBM PC to a professional 640 x 480 16 color workstation. High-resolution board (640 x 480 x 16 color), complete graphics software (HALO), RS 170 monitors, digitizers, plotters, application software, slide cameras, frame grabbers and more. *Media Cybernetics, Inc., 36 Columbia Ave., Tacoma Park, MD 20912, 301/270-2272*

Disk Drives

Hard Disk III
Leading Edge® hard disk III is a 5¼" Winchester disk subsystem. Features a (Z80A) microprocessor which provides 18 high level commands. TRS-80 model III & I and IBM PC compatibility. Provides power for 2 Winchester disk drives. Full sector buffer 256-512 bytes. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

Disk Drives for PC
Save on Tandon Disk Drives.
TM55-2, DS, 40T: $239
TM100-1, SS, 40T: $189
TM100-2, DS, 40T: $239
TM100-4, DS, 80T: $339
Call for CDC drives. VISA/MC or checks. NJ residents add tax. Shipping extra. *VLM Computer Electronics, 10 Park Pl., Morristown, NJ 07960, 201/267-3268*

Microcode Series 5000
Microcode Series 5000 hard disks are for IBM PC and COMPAQ portable computers. Operating system soft-

ware support includes DOS 1.1, Dos 2.0 and concurrent CP/M-86. Self-documenting software provides easy installation and file backup utility. Price: $2495 for 10MB, $2995 for 15MB, and $3595 for 30MB. *Microcode, 45277 Fremont Blvd. #4, Fremont, CA 94538, 415/657-4411*

MICRO

Keyboard

6 Full Size Keytops
Double the size of your return, tab, backspace, O, shift keys. KEYTOPS are non-glare, dark colored and permanently stamped. Make your keys instantly recognizable-reduce reaching and fatigue. No permanent modification, simply press over your existing keys. $18.95. (See display ad this issue) *Applied Dynamics, P.O. Box 1810, Dept. WD, Cottonwood, AZ 86326, 602/634-4507*

Mice

Optical Mouse
Make your existing software easier to use. With our optical mouse and software, you point to commands in a pop-up menu. Instead of cursor keys, you point to where you want to move. No hardware or software changes. Fully user customizable. Great with Lotus 1-2-3. Uses RS-232 port. $332 complete. *Mouse Systems Corp., 2336H Walsh Ave., Santa Clara, CA 95051, 408/988-0211*

Peripherals

IBM PC "Selecto-Switch"™
You can connect a low cost printer and a letter quality printer to the same port of you IBM PC. Our GP24AB can be used to select either printer, just by turning a knob. Several models are available. Prices start at $159 single quantity. Giltronix is the main supplier of switches. Call our local dealers. *Giltronix, Inc., 3780 Fabian Way, Palo Alto, CA 94303, 415/493-1300*

Power Protection

Ramlok
Standby power supply/line voltage conditioner. Automatically switches to standby power if incorrect line voltage reaches equipment. Includes noise and spike filter/Heviduty battery charger with overcharge protection/Frequency controlled inverter. *Ladco Development Co., P.O. Box 464, Olean, NY 14760, 716/372-0168*

RAM LOK

Ladco Development Co.

Printers

Starwriter F-10
This 40 CPS daisy wheel includes low profile design, industry standard ribbons and print wheels, standard centronics parallel or RS 232C, and extensive built-in word processing functions. The Starwriter F-10 printer is supported by a full year warranty and national authorized Leading Edge service centers. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

Printmaster F-10
The 55 CPS model with all the same features as the Starwriter F-10 plus faster print speed and carriage return time, accept data transmission up to 0.600 baud, dual-color ribbons, and original plus 4 copies. The Printmaster F-10 is supported by a year warranty and national authorized Leading Edge service centers. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/ 343-6833, 617/828-8150*

Prowriter
Offers a printing speed of 120 CPS, bidirectional printing, 8 character sizes, and 5 alphabets. Prowriter's NX9 matrix produces correspondence quality print and high resolution graphics. The Prowriter 85 10A provides a 10" carriage. Prowriter 1550 provides a 15" carriage. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

Security

IBM PC Security
Deter unauthorized persons from opening PC system unit. Kit includes specially designed Clarke screwdriver & companion Kent screws, kit price $18.95. Control multiple PC's. Qty disc & extra screws available. To order send check or MO: *Hooker Tech/Eteria, P.O. Box 461, Lawrence, NY 11559*

Storage Devices

Winchester Hardfile Subsystems
Tallgrass Technologies offers a family of high performance, high capacity HardFiles with formatted capacities from 6.25 Mb to 70.0 Mb. With integral streaming tape cartridge backup, the Tallgrass HardFile System has set the industry standard on Performance and reliability. From $3,095 with integral back up. *Tallgrass Technologies Corp., 11667 West 90th St., Overland Park, KS 66214, 913/492-6002*

Tallgrass Technologies Corporation

Leasing

Business Program Leasing
Now rent the business software you need for your IBM/PC or TI-Professional. Pay only for programs you decide to keep, and get full credit for all rental paid. No membership fee or sign-up required. Call 1-800: 323-8064 or write for list of rental programs: *Micro-Mart, Dept. PCW-7, 1131 Central Ave., Wilmette, IL 60091, 312/251-5699*

Mailing Lists

IBM PC Mailing Lists
25,000 IBM PC owners mailing list available now! We are the largest dealer of microcomputer owner's names, with over 411,000 total...many different brands. Plus 7 store lists, 2374 computer clubs, educational lists, micro publica-

tions, and much more. Write or call for free catalog. *Irv Brechner, Targeted Marketing, Box 453, Livingston, NJ 07039, 201/731-4382*

Publications

Infosource for the IBM PC
Monthly, loose-leaf update publication w/timely info. on hardware, software, books & magazines exclusively for IBM PC users. Includes charts comparing prod. & indicates items XT compatible. Convenient, single-source reference binder w/monthly inserts keeps you to date on new PC products. Annual sub. $69, complete current issue $21.95. *Query, Inc., Dept. IBM PC, Box 21, Bogota, NJ 07603, 201/836-7389*

Advertising Tracking
Analysis of ad space, expenditures and market share in over 30 computer publications. Used by ad managers, publishers, space reps, media buyers. Call for complimentary newsletter. *Adtrak, Inc., 1901 Old Middlefield Way, Mountain View, CA 94043, 415/965-7473*

LOTUS 1-2-3
An Introduction to LOTUS 1-2-3, a step by step self-teaching guide to help the novice quickly get into all three aspects of LOTUS 1-2-3. Simple to understand, hints on how to avoid frustration. Includes disk with spreadsheets used as examples. Written by Patricia Shillingburg, author & computer instructor. *Summit Micro Computer Learning Center, 436 Springfield Ave., Summit, NJ 07901, 201/277-3837*

Programming Guide/dBASE II
This is a comprehensive programming guide to dBASE II. Instructions for beginners & advanced programmers. Add-ons such as dgraph, dutil, reviewed in detail. Over 200 pgs. Contains complete Accounting System w/Payroll, Accounts Payable and General Ledger. Order 24 hours. VISA/MC welcome. $39.95 *Automate Computer Software, P.O. Box 290336, San Antonio, TX 78280, 512/692-2437*

Retailers

Ohio

Brand New Software Source!
Total access to personal, educational, business, and entertainment software for your microcomputer. We feature:
- Attractive prices
- Toll free ordering
- Prompt shipping
- Comprehensive catalog with useful programming tips.

Call or write for orders or free catalog. *Access Micro, 11306 Southland Rd., Forest Park, OH 45240, 1-800/543-1114. AK, HI, OH call: 513/825-5803*

Sales/Marketing

Software Authors
Software Marketing Services will help you market your software. If you have a product ready to go, or if you're working on one, we will provide you with the services needed to bring your product successfully to market. We have the contacts: OEM's, publishers, distributors and others interested in your software. For details of our services just write to: *Software Marketing Services, P.O. QQ, New York, NY 10113*

Software

Accounting

Long Distance Analyzer
Saves you time and money by organizing phone bills, identifying parties called, and keeping totals. Use it to cut abuse and waste, bill clients, evaluate special services, print alphabetical dictionaries and cost account by your categories. Menu-driven system can hold thousands of calls. $195. *Golden Braid Software, P.O. Box 2934, Sarasota, FL 33578, 813/371-0388*

Integrated Accounting
The INSOFT ACCOUNTANT is a menu-driven accounting system organized into four packages - G/L, A/R, A/P and Payroll. Each package may be used independently or will post directly to G/L. Designed for easy start-up, comprehensive training manuals and sample data files are included. $365 complete. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

Professional Manager
For A/E firms is a fully integrated Financial Accounting System developed especially for Architectural & Professional Engineering firms. Software package is written in dBASE II & has Job Cost/Billing with integrated Payroll, Accounts Receivable, Accounts Payable & General Ledger. *Automate Computer Software, P.O. Box 290336, San Antonio, TX 78280, 512/699-4029*

Personal Financial Assistant
Accounting system for personal or small-business users. Double entry accounting. Complete financial reports: Balance Sheet/Income Statement, Trial Balance, General Ledger. Up to 5 check journals automatically integrated into ledger. Complete system $100. Documentation only, $25. *L.C. Systems, P.O. Box 5360, Coralville, IA 52241, 319/354-2630*

Agricultural

Feed Mix Programs
MIXIT-2 ($395) finds least-cost rations for all animals. Hundreds of ingredients; 57 user-chosen nutrients. STACK ($295) runs multiple rations using MIXIT-2. PRICE ($295) is a feed pricing and inventory program. *Agricultural Software Consultants, 1706 Santa Fe, Kingsville, TX 78363, 512/595-1937*

Business Applications

Powerful Business Software
Order Entry Invoicing, Inventory Control, Accts. Receivable, Sales Analysis pkg. on most MS DOS Compatibles. History & forecasting graphics, multi-selective Mailing List module, call Planning & Commission Statements. $695 complete. Demo pkg. sample data $50 refundable or applicable toward purchase. *Distributed Computing Systems, Martha & Randolph Streets, P.O. Box 185, Lombard, IL 60148, 312/495-0121*

DISTRIBUTED COMPUTING SYSTEMS

Financial Planning & Analysis
Business planning, strategic planning, capital investment analysis. VENTURE contains all the logic, accounting procedures and equations. You specify your parameters and enter data. 10 reports provide a complete analysis. Consolidations, what-ifs, sensitivity analysis. 192k, 1 drive. Free brochure. $495. *Weiss Associates, Inc., 127 Michael Dr., Red Bank, NJ 07701, 201/530-9260*

Professional Time Accounting
Time Accountant is an essential timekeeping and management tool for professionals. Functions include billing preview, invoicing and reporting by individual, client, project and activity. Includes pocket calendar-time sheets, telephone support. Requires 128K RAM, two 320K drives. $395. *Time Accountant, 1230 University Dr., Menlo Park, CA 94025, 415/328-7877*



The Retailer™ by Retcom
Point of Sale/Inventory Mgmt. system now available for the IBM PC
* Record sales transactions
* Prints tape or invoice
* Computes change, discounts
* Holds up to 30,000 items
* Automatic inventory update
* Prints sales reports
* Menu-driven
* Demo disk available

Retcom Systems, Inc., 1518 Grace Lake Circle, Longwood, FL 32750, 305/339-0370

Retail Sales Control
DATA*EASY can turn your IBM/PC into a cash register with our RETAIL SALES CONTROL software. This package handles inventory, commissions, customers, credit cards, sales slips and sales analysis with little effort. Options include purchase order control, invoice control and mailing labels. RETAIL SALES CONTROL is easy for employees to learn and operate. $295.*DATA*EASY™ Software, Data Consulting Group, 877 Bounty Dr. #EE203, Foster City, CA 94404, 415/571-8100, 415/349-4001*



Critical Path Scheduling
PMS-11 project management system. Plan & manage any complex project — R & D, mfg, construction. 500-2500 events. Plots critical path, network, Gantt, funding. Many sorts/reports. Team with RMS-11 for capacity planning and load leveling. Professional tools to cut cost and time. *AHA, Inc., P.O. Box 2003, Santa Cruz, CA 95063, 408/475-7247, 408/475-8705*

AHA

Myte Myke Business Systems
Commerical Grade - Integrated Packages
- Business Acct: O/E P/O A/R S/A A/P G/L
- Mfg. Ctrl.: STD Cost, BOM, Oper Rtg, Sched-FCST, MRP, SFC, where used.
- Insurance Agy: Mgt, Auto Rating, Mktg.
- Professional: Time and billing, installation + on-going support avail. CP/M UNIX, others.

MDS Associates, P.O. Box 108, Orchard Park, NY 14127, 716/662-6621

MYTE MYKE™

Mailman
Mailman computes postage and fees for all classes of mail and additional services provided by the US Postal Service. MAILMAN is functionally equivalent to the program found at many post offices. Why pay more for postage than you should? Why wait in line for the straight dope? *Polyglot Productions, P.O. Box 668, Cambridge, MA 02238, 617/491-3541*

CDEX & VisiCalc
SAVE $119 when you buy the CDEX and VisiCalc programs for the IBM PC. We will give you a free CDEX Software program when you buy VisiCalc at our low price of $190.50. Offer good only while supplies last. Call 800/235-4137 to order. In CA call 800/592-5935. *Pacific Exchanges, 100 Foothill Blvd., San Luis Obispo, CA 93401*

Business/Home

13 from DATA*EASY™

Project Scheduler	$35
Bar Graph Generator	$35
Telephone Directory	$35
Screen Design Aid	$35
Programmer Utilities	$50
Mail Lists & Labels	$75
Data Entry & Edit	$75
Inventory Control	$95
Mail Order Control	$95
Product Invoicing	$195
Purchase Order Ctl	$195
Time & Material Inv	$195
Database Control	$195

*DATA*EASY™ Software, Data Consulting Group, 877 Bounty Dr. #EE203, Foster City, CA 94404, 415/571-8100, 415/349-4001*



Catalogs

Something Special!
Here is a unique pocket sized catalog of pre-selected software for the IBM PC. Products are described by key and unique features and are organized from Financial Modeling to The Unusual. Complete w/ other review references, a 30 day $ back guarantee on software ordered & a Business

Software Search Service. The best part - $2. *UOI Company, 7716-B Balboa Blvd., Van Nuys, CA 91406, 213/785-5050*

Communications

Remote Access
Have complete use and control of an unattended IBM PC. Develop and run programs, transfer binary or ASCII files, etc. Password protection and full simulation of the IBM keyboard. $89 with full-screen support. Call or write for information. VISA/MC. *Custom Software, P.O. Box 1005, Bedford, TX 76021, 817/282-7553*

Lync
You can't buy a better communications program! Lync is powerful, easy to use and easy to install. Transfers ANY files between PCs or PC and CP/M systems. TERMINAL mode for connecting to databases. REMOTE mode to run your computer remotely. Free brochure. $155. *International Software Alliance, 1835 Mission Ridge Rd., Santa Barbara, CA 93103, 805/966-3077*

Relay
Compare and try RELAY. Help key, Hayes support, saves phone numbers, send spreadsheets PC to PC, Send/Rec. simultaneously, full-screen Editor, Up & Download, APL keyboard, 50-9600 baud with error checking. Don't underestimate RELAY because of its $89 price. *VMPC, 60 E42 St. New York, NY 10165, (212) 697-4747*

Compilers

8087 Support from MicroWare
Your headquarters for the 8087 and software support. Fastpak™ includes the 8087, installation instructions, one IBM Compiler or assembler library and the 87/88 GUIDE. $375. 87 FORTRAN/RTOS™ includes the Intel compilers running on our real time, multi-tasking operating system. MicroWare-you can talk to us. *MicroWare, P.O. Box 79, Kingston, MA 02364, 617/746-7341*

C Compiler•Debugger
Designed around the c-systems optimized C Compiler, the c-window™ package provides source statement execution and breakpoints; variable display and alteration is accomplished using C expression syntax. A must for all C programmers. 128K, two floppy drives required. C Compiler $195, c-window $195. *c-systems, P.O. Box 3253, Fullerton, CA 92634, 714/637-5362*

C86-C for Professionals
"C" brings great power, control and conciseness to programming. C86 brings FULL UNIX syntax (portability), source to a rich library (gives you control), no royalties, PCDOS & CPM-86 support, and overlays. Hotline support is solid. $395. Call you Dealer or CI. *Computer Innovations, Inc., 10 Mechanic St. Ste. J-110, Redbank, NJ 07701, 201/530-0995*

Data Management

VersaForm
Business Form Processor uses existing or new form designs to compile/process data. Includes many data entry validation features, automatic entry filling, automatic calculations. Also formats data for output on preprinted forms. Produces analytic/management reports using record/data selection, sorting, totals/subtotals. $389. *Applied Software Technology, 14125 Capri Dr., Los Gatos, CA 95030, 408/370-2662*

RESQ-The Ultimate DBMS
The only system that makes it fast and easy to design and create your forms and reports right on the screen! Calculates, reads, searches, sorts faster than other systems tested; interfaces w/word processing programs. With plain English manual, help screens, and password protection. $395. *Key Software Inc., 2350 E. Devon Ave. #138, Des Plaines, IL 60018, 312/298-3610*

The DataFiler
Put the power of your IBM PC to work on your various lists with our easy to use menu-driven DataFiler program. It's a time saver, information organizer, and a very good investment at only $225. Generate personalized form letters using The DataFiler, Merge'n Print ($149), and your word processing program. Mailing label programs also available, $95. *MBS Software, 12729 NE Hassalo St., Portland, OR 97230, 503/761-4137, 503/256-0130*

Data Design
Managing office information is now easy with Data Design, the first database management system designed specifically for the IBM PC. Data Design supports multiple user-defined data tables and input/output forms. Indexes are maintained automatically and sorting is never required. Examples included. $225. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

Development

Active Trace-BASIC Window
Automates the tedious part of BASIC programming/debugging, leaving you time to learn & create. Pops a window into BASIC which displays variable values as your program runs. Output to screen, printer or disk. No need to single step. XREF mapping. Review in BYTE 4/83, p.334. $79.95. Call for details. *Awareco, P.O. Box 695, Gualala, CA 95445, 800/358-9120, 707/884-4019*

Educational

Professor DOS
Interactive, self-paced tutorial program designed to teach new PC users important PC concepts, including MS-DOS. Simulates MS-DOS operations, allowing you to freely experiment. Uses graphic images, sound, animation and color to help you learn smarter, faster, easier. Available at fine dealers. $59.95. *Individual Software, Inc., 24 Spinnaker Place, Redwood City, CA 94065, 415/591-4166*

MasterType
Typing instruction in game format. Zap the enemy word by typing it correctly or the word zaps you. Eighteen progressive lessons, graduated from home-letter recognition to nine-letter words, numbers and BASIC programming words. Ability to create your own lesson to meet individual needs. $49.95. *Lightning Software, Inc., P.O. Box 11725, Palo Alto, CA 94306, 415/327-3280*

The Instructor
A self-paced tutorial program that teaches first-time users how to interact with the PC. Designed to be the first serious software run by new users of all ages. Uses graphics, sound and color to create friendly interaction. See your local retailer. $44.95. *Individual Software, Inc., 24 Spinnaker Pl., Redwood City, CA 94065, 415/591-4166*

Foreign Language Software
POLYGLOT LANGUAGE SOFTWARE is a must for learning a foreign language. Use it to compile and maintain word lists, quiz yourself & print study lists. Minimum system required is IBM-PC, 48K and drive. Polyglot Language Software is quality at a low price: $12.95(+CA tax). For order or more information: *Alchemy Software, Box 1057, Aptos, CA 95003, 408/688-6252*

PC Pal•PC Tutor 1.1 or 2.0
PC PAL introduces the user to the keyboard, spreadsheet, wordprocessing, BASIC & the computer hardware, $39.95. PC Tutor enables users to get rid of all the confusing instruction manuals. Learn how to use MS-DOS 1.1 or MS-DOS 2.0 by doing. $59.95. Available for Compac, PC, Texas Instrument Pro., Lang. & others. *Comprehensive Software, 2316 Artesia Blvd., Ste. B, Redondo Beach, CA 90278, 213/318-2561*

PC/Pilot
Language for education and training. By MicroPi, the source of PILOT on the other major personal computers. Meets Common PILOT standard. Extensions for color, graphics, user fonts, windows, files and video disk/tape control. Includes EZ editor. Lic: $100 single, $550 multiple. *Washington Computer Services, 3028 Silvern Lane, Bellingham, WA 98226, 206/734-8248*

PC Logo
Full implementation of the logo language for the IBM PC. An ideal interactive language with graphics, fully-integrated editor, list structure and recursion. Complete tutorial and technical manual included with language and utilities disks. Runs with MS DOS in 64K expandable to 128K. $199.95. *Harvard Associates, Inc., 260 Beacon St., Somerville, MA 02143, 617/492-2999*

Filing

KWIC-REF/1
A general-purpose text filing system. It is designed to file and cross-reference documents, notes, letters and any text records. It can keep track of up to 32,000 key words and 32,000 documents. Retrieval is by key words with "and" "or" and "xor" combinations. $450. *Chen Information Systems, Inc., 1499 Bayshore Hwy. #205, Burlingame, CA 94010, 415/692-4358*

Financial

Money Maestro
A financial record-keeping package that provides budget tracking and tax reporting. Money Maestro reports totals by category or payee, including monthly and year-to-date budgeted vs. actuals. Data files are stored in BASIC sequential format. MONEY MAESTRO requires 64K, DOS. *Innosys, 2150 Shattuck Ave. # 901, Berkeley, CA 94704, 415/843-8122*

Money Manager
Get more control over your money. Money Manager handles yearly incomes and expenses on a monthly basis. You can easily budget for those months certain bills need to be paid and know how much spendable income you have throughout the year. $39.95 plus postage. FREE calculator program. *People Literate Software, P.O. Box 2039, Bozeman, MT 59715, 406/586-1581*

Electric Ledger
Easy to use checking program for personal or small business accounts. Easy data entry, menu driven, great at tax time, searches, sorts & totals to any keyword, balances checkbook, reconciles bank statement, computes mortgage loan, compound amount & more. 2 DD, 80 col. $35. *Datacon Consulting, 2311 W. 5700 S, Roy, Utah 84067*

Taxation
1982 individual tax program for extensions and 1983 interview sheets, $100. 1983 Federal tax program, $500 ($100/each per state available). 1983 Federal and available State tax planner, $200. *Pencil Pushers United, Inc., Dept. PCW, 25 S. Greeley Ave., Chappaqua, NY 10514, 914/238-9600*

Stock Options Programs
Essential programs for stock options investors. Strategy analysis in mere minutes. Spreadsheet formats for easy viewing and adjustment. Pinpoint potential profit or loss before money is actually invested. For IBM-PC, TRS-80, CP/M. Call or write for more information. Custom assignments welcome. *Star Value Software, 12218 Scribe Drive, Austin, TX 78759, 512/837-5498*

STAR VALUE SOFTWARE

Itemizer
Keep track of expenses and incomes in the order you want. Any type of expense or income can be put into a separate category with comments. Subtotals may be calculated at any time. The Itemizer makes record keeping a snap, excellent for tax itemizing. $39.95 plus postage. FREE calculator program. *People Literate Software, P.O. Box 2039, Bozeman, MT 59715, 406/586-1581*

Wall St.-Plotter
This unique stock-charting program calculates and displays hi/low, moving ave., point-figure, daily volume, and on-balance-volume charts for any security. Daily trading data are updated by user thru keyboard. $169 includes program and historical trading data for 9 stocks of user's choice. No modems are necessary. 64K min, monochrome display. *Spring Dale Software, 1507 Evesham Rd., Voorhees, NJ 08043, 609/795-1454*

Time Value of Money
This program evaluates the effect of time on the value of money. Present-future worth, mortgage, annuity, gradient, and balloon analyses let the user play "what if." Extensive descriptions and examples for each analysis make TVM easy to learn and use. $39.95 plus postage. Free calculator program. *People Literate Software, P.O. Box 2039, Bozeman, MT 59715, 406/586-1581*

Games

Space Miner
Take an incredible mining voyage at new levels of animation excellence & arcade excitement! Maneuver ships to grab ore w/ controllable robot arm. Blast aliens w/twin missile launchers. Top 10 players; stop action; 3 play levels; J.S. Bach; More! Req: 64K, colorcard, PC-DOS, 1dd. keybrd. or joystick control. $29.95. VISA/MC. *Resolution Software, 8 Edgewood Blvd., Providence, RI 02905, 401/461-2417*

Resolution

The Chrome Ranger
Acclaimed by owners and reviewers for quality speed, appearance, and tasteful sound. Fast-action arcade-style maze game for the IBM PC and any display. 64KB + 1 drive. Keybd. or joystick control. Selectable and progressive skill levels. $29.95, check/MC/VISA. Version 2.0 works with all PC-DOS versions. *Omniware, 8972 E. Hampden Ave., Box 32, Denver, CO 80231*

Educational Games

WordTrix
Fast and challenging word game that pits you against the computer. Both you and the PC find words in a random grid of letters, but the computer - with its built-in dictionary and multiple levels of play - is a formidable opponent! 1st in TRIX series of educational games. $34.95. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

QuoTrix
Following a trail of clues using crossword puzzles, trivia questions, foreign word translation and other word games, players try to guess a famous quote by piecing together each discovered word. Several hundred quotes to tackle! 2nd in TRIX series of educational games. $34.95. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

Genealogy

Family Reunion
Keeps track of living relatives as well as genealogical data. Produces address labels, birthday lists, pedigree charts, family group sheets and more. Includes User's manual & sample data disk. Price $99.95. Requires DOS, 2 drives, 64K and PC printer capabilities. VISA/MC/COD/ Dealers ok. Add $2.50 S & H. *Personal Software Company, P.O. Box 776, Salt Lake City, UT 84110, 801/277-3174*

Graphics

Ultradraw™ Graphics
An extensive 2-D geometry creation package for engineers, architects, graphic artists & slide makers requiring precision graphics. Ultradraw™ features autodimensioning, variable text hgt/wdt, grids, graphics merge, parts & symbol libraries, multiple rotate, duplicate mirror & line fonts. Retail $195. Intro. offer $149. *Ultrgraphics™ Systems, 1100 South Main, Racine, WI 53403, 414/633-7381*

HALO-Complete Graphics Tool
HALO, OEMs choice for graphics applications under MS DOS. HALO, the ad hoc MS DOS standard. Versions for BASIC/PASCAL/"C"/ MACRO Assembler & FORTRAN. Complete tool box of optimized subroutines for every graphics application. Custom installations & configurations avail. All major graphics boards supported. *Media Cybernetics, Inc., 36 Columbia Ave., Tacoma Park, MD 20912, 301/270-2272*

PC-Draw
Transform your PC into a fast, flexible drawing tool. Eliminate costly and time consuming flow chart (or any other business document) preparation and revision while gaining unlimited flexibility to create, maintain and print drawings. Comes with 2 symbol menus plus the ability to create your own. List price: $250. *Micrografx, 8526 Vista View Dr., Dallas, TX 75243, 214/343-4338*

OkiPrint
A graphics print program for the OkiData Model 82A/83A w/OkiGraph and 92/93 printers. With 82A prints medium resolution. With 83A, 92, 93 will print either medium or hi resolution. Specify printer. Source code provided. Send $19 to: *The Software Factory, P.O. Box 1024, Marina, CA 93933, 408/372-2160*

Health

InShape
The nutrition and fitness program for IBM PC users. Records and analyzes your eating habits; helps you measure your progress on the road to personal fitness - $95. From the makers of PerFin - the personal money manager for the IBM PC - $65. Custom software and consultation services available. *DEG Software, 11999 Katy Frwy. #150, Houston, TX 77079, 713/531-6100*

Insurance

The Agency Manager™
Designed by insurance professionals for independent insurance agents, this integrated system performs Complete Customer Acctg., General Ledger, Client Data update & retrieval (# files depends on your storage), over 100 Marketing Reports & Sales Tools, ACORD'S. Easy main menu & HELP feature. Ivans. IBM-XT, CP/M, Turbodos. *Applied Systems, Pauling Rd., Monee, IL 60449, 312/534-5575*

The Agency Manager™
Applied Systems

Investments

Technical Investor
Chart and analyze commodities or stocks. GRAPH1 ($199) plots HLC, trendline, and SYSTEM1 studies in hi-res. Manual or modem data collection. SYSTEM1 for printer ($59) has three types of moving averages, oscillators, etc. Both $229. Requires 128K 1 drive. Write for details, other software. *Dillon Gage Inc. of Chicago, 1631 W. Lunt, Chicago, IL 60626*

Languages

FORTH-32
The language for the IBM PC. Now you can program using the entire megabyte of memory. FORTH-32 Development System: $150. Package Builder Utility: $50. Floating Point and Math Library: Software $50, 8087 Hardware $50. See our display ad this issue. *Quest Research, Inc., P.O. Box 2553, Huntsville, AL 35804, 800/558-8088, 205/533-9405 (AL)*

Quest Research, Inc.

muLISP-83
An integrated environment for AI software development. Includes a high performance, pseudo-code LISP compiler; a resident, screen-oriented editor and debugging system; and a detailed reference manual. $250. Also available, the muMATH Symbolic Math System, $300. *The Soft Warehouse, P.O. Box 11174, Honolulu, HI 96828*

EMCEE
EMCEE is a structured programming language especially for rapid development of prototypes, computer assisted instruction courses, and interactive demonstrations. EMCEE reads like English and is particularly well suited to screen formatting. Introductory special, $99. *System Vision Corporation, 199 California Dr. #207, Millbrae, CA 94030, 800/352-9999 (Nat.), 415/697-3861 (CA)*

MetaBASIC
A powerful language preprocessor which greatly simplifies program development in BASIC. A key feature is the ability to use subprogram CALLs with arguments. Also supported are selected features of other popular languages (C, PASCAL, FORTRAN) which allow large BASIC programs to be developed in a structured, truly modular fashion. Only $59. *Software 128, 363 Walden Street, Concord, MA 01742, 617/369-6400*

Mailing Programs

Mailtrak™
This package does it all! Mail labels up to 4 across; phone directories; instantly locate records by Name, Company, City, State or Zip. Create WordStar or EasyWriter files for form letters. Sort & select on all data. Tracks 2 phone #'s, 5 user-defined profiles plus 4 activities with dates. $65 Visa/MC. *TCI Software, 6107 West Mill Rd., Flourtown, PA 19031, 215/836-1406*

TCi

Manufacturing

Twin Oaks MRP-II
- Bills/Material
- Inv Control
- Purchasing
- MRP & CRP
- Master Sched'g
- Phys Inventory
- Std Costing
- 22 Modules
- 128K PC or XT
- DOS 1.1 or 2.0
- Hard/Soft Disk
- Online-Realtime
- Multi User
- Acctg Interface

Twin Oaks, 2650 Colfax N., Minneapolis, MN 55411, 612/588-2685

Twin Oaks

MAX, The Production Manager
A fully-integrated production, planning and control system for manufacturing firms. Bill of Materials, Inventory Control, Master Scheduling, MRP, Purchasing & Shop Floor Control for the IBM PC. Installation & support by established network of national & international reps. *Micro-MRP, Inc., 1065 E. Hillsdale Blvd. #114, Foster City, CA 94404, 415/345-6000*

Medical

Threshold
Medical office management software featuring automatic insurance preparation w/teleprocessing to Blue Shield & Medicare, unattended statement processing, total security w/audit trails, statistical information, complete inquiry

& management reports & online help. List $5,500. *Physicians Practice Management, Inc., 1810 South Lynhurst Ste.Q, Indianapolis, IN 46241, 317/248-0357, 800/792-3525 (IN), 800/428-3515 (Nat)*

Physicians Practice Management

Diet Monitor Systems
Camrass Corp. writes some of the most advanced systems for analyzing diets & nutrition. All systems include extensive data base and sophisticated reporting capabilities. Home diet monitor for you and your families diet. Professional diet system-designed for medical uses and currently being used by hospitals and dieticians. VISA/MC. *Camrass Corp., P.O. Box 118, Boonton, NJ 07005, 201/328-8917 (24 hours)*

Physician's Office System
POS/1 is a medical billing and accounts receivable system. POS/1 facilities: immediate access to patient status by account number or name, automatic RVS or ICDA codes with manual overrides, receivable aging report, track next visit date, menu driven with on-line help screens. $950. *Chen Information Systems, Inc., 1499 Bayshore Hwy., # 205, Burlingame, CA 94010, 415/692-4358*

CHEN

Literature Filing System
SEARCHLIT stores and searches information related to your own literature collection. Retrieval based on key words in title/abstract/special key word file. $149.50 (Plus 6% in CA) Mention PC World Directory and receive MediScript I Word Processor. 30 day satisfaction guaranteed or your moneyback minus $4 S/H. *MediSoft, 1595 Soquel Dr. #350, Santa Cruz, CA 95065, 408/476-7106*

Operating Systems

Development System Tools
Operating System Development Tools Universal Development Interface and iRMX86 implementations for PC DOS/MS-DOS based systems. A complete family of Development Tools. See display ad this issue. *RTCS/Real-Time Computer Science Corp., P.O. Box 3000-886, Camarillo, CA 93010, 805/482-0333*

RTCS REAL-TIME COMPUTER SCIENCE CORPORATION

Personal

Dear Diary™
Make your PC truly personal. Dear Diary™ . . . is a software program that quickly and easily puts your entries into a private Diary file which cannot be read without your password. Won't stop NSA or CIA if they're interested, but will exclude most others. $79.95. VISA/MC. *Q'n'E Associates, 635 Bair Island #115, Redwood City, CA 94063, 415/366-6062*

Productivity

Organization Map™
A powerful management tool for the IBM PC that improves organizational productivity and enhances the management of human resources. Essential for managers committed to organizational excellence. Offered for the first time to companies outside the Fortune 1000. Demonstration disk $35. *Pacesetter Software, P.O. Box 5270 Dept. A, Princeton, NJ 08540, 609/737-8351*

Publishing

Authors/Programmers
If you have a program or an idea for a program, we would like to talk to you about marketing it. We will provide as much or as little assistance necessary to get your program from wherever it is into the users' hands. Let's meet to discuss your program. Write or call us today! *Dataseek, P.O. Box 11071, Palo Alto, CA 94306, 415/325-4101*

DATASEEK

Sort

Opt-Tech•Sort/Merge
Extremely fast Sort/Merge program for the IBM-PC. Can sort or merge multiple files containing fixed or variable length records. Run as a DOS command or call from BASIC, plus many other features. Compare before you buy any other. Write or call for more info. $75. *Opt-Tech Data Processing, P.O. Box 2167, Humble, TX 77347, 713/454-7428*

DP

Statistics

Statistician's Mace
Calculates many statistics frequently used by scientists, business researchers, engineers, statisticians, and others who need to analyze survey and experiment data. Possibly the only program that performs the Hodges-Lehman aligned ranks test. Requires 128K. Introductory price $145. *Mace, Inc., 2313 Center Ave., Madison, WI 53704, 608/241-4566*

MACE

MathTab™/MathStat™
Statistical software systems for microcomputers that support data management, documentation, descriptive statistics, crosstabs, frequency/breakdowns, regression, ANOVA, logit, probit, and much more. Can enter data from ASCII files, use direct data entry or link from a DBMS. Dealer inquiries welcomed. *Mathematica Policy Research, P.O. Box 2393, Princeton, NJ 08540, 609/799-2600*

Stock Market

Market Counselor
MARKET COUNSELOR's "indicators" can help you with stock market DIRECTION AND TIMING. Using the program's signals, $10000 in four Dow Jones stocks and

options in 8/79 would have been worth over $95000 in 11/79. Only $149. Brochure, demo($5) and supporting information available. Future results may vary. *Capital Management Systems, Inc., Box 11595, Denver, CO 80211, 303/595-9998*

Wall Street Window
Comprehensive stock pkg.
- Auto. access to Dow Jones, CompuServ. Retrieves, updates, packs more data.
- Complete portfolio mgmt.
- Spreadsheet compatible
- Clearest graphs/hi-res, price, vol. & to printer
- Extensive analysis/moving avgs., stock comparisons, trendline, more.

$395. Demo/$75. *R & D Software Associates, Box 2727, Reston, VA 22090, 703/620-2509*

WALL STREET WINDOW

Stock Portfolio Reporter
Provides up to the minute information on key parts of investor's stock account. Market price updates by DOW JONES; easy link to Hayes Smartmodem. Sort by P/E, gain/loss, yield or any item in SPR's 8 useful reports. Friendly menu displays & manual. Requires 128K, 2dd. Demo disk avail. $179. VISA/MC welcome. *Micro Investment Systems, Inc., P.O. Box 8599, Atlanta, GA 30306, 404/892-3194*

MICRO INVESTMENT SYSTEMS, INC.

Systems

Multiple Users Under PC-DOS
MultiLink turns PC-DOS into an efficient multi-user multitasking operating system. Additional users are supported by attaching inexpensive CRT terminals or modems to serial ports on the PC, and can run normal applications designed for PC-DOS. Includes host communications software for public dial-in. *Software Link, Inc., 6700 23-B Roswell Rd., Atlanta, GA 30328, 404/255-1254*

Tools

One-Key Step-Scroll
BASIC Programmers. This routine replaces the LIST command and steps through your programs forward, backward, or repeats the same lines. EDIT or RUN the program between steps and continue with only one key stroke. Step parameters can be reset at any time. Includes other features. Diskette, $17. *IRC Associates, 125 Sherrfield Dr. #X9, Saginaw, MI 48603, 517/792-2156*

Master Your EPSON-FX
Touch a key, set a mode! SET-FX™ quickly sets condensed, emphasized and over 50 other modes. Print the "missing" IBM characters! Block graphics, Greek letters, and symbols print in full-speed text mode. Even create your own fonts! IBM owners with Epson FX-80/100 send $39.95 with order. Dealers inquire. *Softstyle, Inc., 7192 Kalanianaole Hwy. #200, Honolulu, HI 96825, 808/396-6368*

Trading

Legally Trade PC Software
Softraders™ matches users wanting to exchange original disks and documentation. We offer unlimited trading opportunities thru worldwide network with quarterly directories & monthly updates. Call now or send system description, titles of programs you have & want plus return postage. You get results! *Softraders International, 1610 Shomaker Dr., Murphysboro, IL 62966, 618/687-4799*

Utilities

1DIR for the PC & XT
Replaces the DOS prompt with an interactive command system that eliminates the need to type commands and filenames on the command line. Easy to use. 1DIR enables you to load files and run programs by positioning the FILE and COMMAND CURSORS and pressing the <Enter>key. Retail $95. *Bourbaki Inc.™, P.O. Box 2867, Boise, ID 83702, 208/342-5849*

Peeks'n Pokes for IBM PC
BASIC and Pascal programmers - discover the secrets of the PC! Find out how to access and modify configuration, keyboard, disk, printer, communications, and monitor status. Perform DOS and BIOS function calls! Learn how to find more Peeks'n Pokes. Disk (58 programs) and manual - Only $30 plus $2.50 shipping. MC/VISA accepted. *Data Base Decisions, 14 Bonnie Lane, Atlanta, GA 30328, 404/256-3860*

PC Disk ID
Eliminate the need under PC-DOS 2.0, to reformat disks in order to add, change or delete volume labels. Prints sorted list of files (including hidden files) from disk directory to labels or to a listing. Also allows recovery of files erased inadvertently. Requires PC-DOS 2.0, 1 disk. $30. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

ARCHIVES V Disk Backup
Reduces diskette backup costs by 90 percent. The PCs' built-in cassette interface can save six full diskettes on one ninety minute audio cassette. The utilities process only required information reducing transfer time and tape usage. Specify 64K or 96K version when ordering; $39.95. MC/VISA. *Indiana Digital Corporation, P.O. Box 3755, South Bend, IN 46619, 219/288-7280*

ARCHIVES V

PC Padlock
Unique encryption scheme protects EXE-COM programs from running after unauthorized duplication. Copy programs such as COPYPC will not copy after running this easy to use program on your products disk. Protect your software investment & valuable market place. Works with all DOS versions. $99. VISA/MC. *Glenco Engineering, 915 E. Carpenter, Palatine, IL 60067, 312/537-4200*

CATalog™ Diskette Librarian
A NECESSARY organizational tool. EASY and TIME SAVING. ADD, DELETE, EDIT, UPDATE, LIST volumes on screen, printer, or disk file in several formats. Supports user comments on volumes and files. Maintain up to 150 volumes on one 320K disk. Will run from Hard Disk. Req: 96K-DOS 2.0. Visa/MC, MO, check, COD. Only $34.95. *MultiPro, Dept. PC-1, P.O. Box 342, Saline, MI 48176, 313/429-2344*

Enhance WS
A powerful utility program which allows the user to customize WordStar. All of the function keys, the home, end and del keys can be redefined, 25 power up default parameters can be changed and the installation of special printer features: subscripts, superscripts, compressed print, etc. on any printer. *Enhance WS, 1020 Sagamore Parkway, West Lafayette, IN 47906, 317/463-3546*

PC File Compare
Compare disk files & get meaningful results. See the difference when a non-compare occurs. PC File Compare displays actual records that fail to compare, not just the offset into the files. Compares files of different lengths, individual files, or allows specification of Global filename characters. $50. NJ add 6%. MC/VISA. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

640K Mem Access Old PCs
You don't have to buy a new PC to access more than 544K of memory. With the SETMEM utility, DOS recognizes up to 640K of memory on your current PC. Need to know if your programs run on small PCs? SETMEM can also reduce your DOS-recognized memory without re-setting DIP switches. $35. *Tyler Software, 233 Rodney Circle, Bryn Mawr, PA 19010, 215/525-5478 (after 6)*

Industrial Strength Basic
Line Number Remover. Unreferenced line numbers use memory & prevent full optimization. Remove unwanted line numbers with /N. Give the BASIC Compiler a chance to give you tighter, faster code. Give yourself the chance to include better error handling. Your users will thank you. $30. (Check or money order.) *Sherborn Software Systems, 226 Western Ave., Sherborn, MA 01770, 617/655-6543*

KEYTOOLS
For BASIC Programmers. Powerful productivity builders from the toolkits of the pros, made easy to use. Formatted data entry; screen painter (one keystroke color changes); brilliant text graphics; and more. Commented, compact and compiled versions of each, plus interactive tutorials. Copyable. Need PC-DOS 1.1, 64K, one drive. $40. *Key-1 Computer Systems, 178 Spring Street, Newport, RI 02840, 401/849-4562*

EZdBASE
Introducing the ultimate formatting utility for use with dBASE II. EZdBASE generates dBASE menus and screens in 1/10 the usual time at 1/3 of competitor's cost. Simply draw your screen using all 256 characters on IBM PC. EZdBASE creates screens with up to 64 fields. Guaranteed. $95 + $5 shipping. EZdBASE Introductory Offer. *EZSoft of Atlanta, 11 Palace Green Place, Atlanta, GA 30318, 404/351-8358*

Backup Program
Copy 11 PC copies protected and unprotected software without modifying data and verifies the disks it creates. Available memory is fully utilized to minimize diskette duplication time. In addition, Copy 11 PC includes a drive speed utility that can pinpoint drive problems. See our ad in this issue! $39.95. Add $2 s/h. *Central Point Software, P.O. Box 19730 - #203, Portland, OR 97219, 503/244-5782*

IBM XT & DOS 2.0 Users
DOSshell - enhances DOS 2.0. Features: Creates a user-friendly "shell" surrounding your system/Automates commands/Organizes programs & data by Menus/Online help at all levels/Utilizes function keys. Includes: disk archive, data search & more. Extensive manual makes sense of DOS 2.0. Disk and manual: $49.95. *XTC Software, P.O. Box 902, Santa Barbara, CA 93102, 805/967-7837*

Print-Screen (Text/Graphics)
SHIFT-PRTSC calls an assembly language printing procedure for text, medium & high resolution graphics screens. Language independent. May also be easily called from a BASIC program. For PROWRITER, PROWRITER II, and NEC 8023A printers. Price includes extensive manual and shipping. $35. *Soft & Friendly, Route 2, Box 65, Solsberry, IN 47459, 812/825-7384*

Word Processing

VisiWord & VisiSpell
SAVE $335 when you buy the VisiWord and VisiSpell programs for the IBM PC. We will give you a free VisiSpell program when you buy VisiWord at our low price of $264.50. Offer good only while supplies last. Call 800/235-4137 to order. In CA call 800/592-5935. *Pacific Exchanges, 100 Foothill Blvd., San Luis Obispo, CA 93401*

DynaWriter
Easy to use Word Processor that provides all the capabilities individuals or offices need for correspondence & report writing. Choice of format & print size; Edit in text mode; Move blocks of text between pages; Address envelopes; Word count & search; Alphabetize; etc. Works w/mono or color display & multiple printers. $100. *IntelSoft, Inc., 1259 El Camino Real #164, Menlo Park, CA 94025, 415/854-2777*

User Groups

The PC Club Connection
For individuals, groups & businesses
* The PC Club Connection Newsletter
* Newsletter/Software Exchange
* Hardware/Software search service
* Discount buys, contests
* PC Consumer Action Service
* Soon: PCCC Bulletin Board System
Charter Membership $10. *The PC Club Connection, P.O. Box 1720, Morgan Hill, CA 95037, 408/779-8913 (collect)*

PC/FORTH™

Why you should try FORTH on your IBM® Personal Computer . . .

- FORTH is interactive and conversational like BASIC, but twenty times faster!
- FORTH's performance is far superior to ordinary interpreted languages, and when carefully tuned can approach the speed of equivalent assembly language programs.
- FORTH's compiler includes constructs that support modular, structured programming.
- FORTH is largely written in itself and is highly portable (can you imagine a BASIC interpreter written in BASIC?)
- FORTH includes a user-controlled virtual memory facility for program text and data.
- FORTH permits easy user definition of new data types and control structures.

PC/FORTH is available for PC-DOS, CP/M-86, and Concurrent CP/M® .

PC/FORTH is compatible with PC-DOS 2.0, the PC/XT, and all hard disks.

PC/FORTH™ $100.00

Includes interpreter/compiler with **multi-tasking** and virtual memory management, screen editor, assembler, debugging aids, many demonstration programs, and 150 page manual. PC/FORTH uses standard disk files for program and data storage.

PC/FORTH + ... $250.00
Allows creation of FORTH programs up to 1 megabyte in size!

FORTH Cross-Compiler $300.00
Used to produce dedicated disk or ROM based applications. No license fee for compiled programs. Choose target microprocessor from Z-80, 8080, 8086/88, 68000, LSI-11, or 6502.

Extension packages

PC/TERM for Smartmodem	$ 60.00
QTF + editor/text formatter	50.00
Software floating point	100.00
Intel 8087 support	100.00
Advanced color graphics	100.00
Interactive symbolic debugger	100.00
PC/GEN custom character sets	50.00
Hierarchical file manager	50.00
B + Tree index manager	125.00
B + Tree index and file manager . . .	200.00
Cross reference utility	25.00

"Starting FORTH" tutorial . . $ 16.00

PC/FORTH requires 48 kbytes RAM and 1 disk drive. Cross-Compilers require 64 kbytes RAM. All software distributed on single-sided double density soft sectored diskettes. Prices include shipping by first class mail or UPS within USA and Canada. California residents add appropriate sales tax. When ordering, specify PC-DOS, CP/M-86® , or Concurrent CP/M-86 please!

Laboratory Microsystems, Inc.

4147 Beethoven Street
Los Angeles, CA 90066
(213) 306-7412

IBM is a registered trademark of International Business Machines Corp.
CP/M is a registered trademark of Digital Research, inc.
PC/FORTH and PC/GEN are trademarks of Laboratory Microsystems, inc.

Just Announced

The wide world of PC products

Edited by Anna Bunker

In the fast-paced personal computer marketplace *Just Announced* acts as an alert service to keep you abreast of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. Many of these descriptions will be followed up by reviews in this or future issues.

Hardware

Boards

MicroGate, MicroGate II
IBM 2780/3780 data terminal emulators that require 64K, one disk drive, and a modem. The controller fits into any available slot. The products include a serial communications controller, communications software, and a modem cable. They enable the PC to communicate with other micros and mainframes that support the bisync communications protocol. Both products operate with asynchronous and synchronous modems.

MicroGate features remote command, transparent and nontransparent communications, interactive and batch processing, and file concatenation, allowing sets of files to be transmitted as a single file.

MicroGate II interfaces with MS-COBOL; it enables the PC to communicate with a remote computer within a user-written application. The user need not exit from the applications program to begin communications.

List price: MicroGate $895, MicroGate II $895. Gateway Microsystems, Inc., P.O. Box 10998 #542, Austin, TX 78766, 512/250-9795.

Computers

USS 8/16
A multiuser system that runs applications software under PC-DOS, MS-DOS, CP/M-86, and CP/M-80 simultaneously. The system can support up to eight terminals. Two versions of the computer are available: the USS 8/16 with a Z-80 microprocessor for 8-bit CP/M applications and an 8086 for 16-bit applications, and the USS 8/16 + with a Z-80 and Intel's new 286 microprocessor. The 286 is a faster superset of the 8086 that includes memory management and virtual memory. Two math co-processors, the 8087 and the 287, are available as options.

The USS 8/16 + comes with up to 4 megabytes of on-board RAM, 5¼-inch and 8-inch floppy disk drives, and either a 20- or 40-megabyte hard disk drive. Both versions include a revised Key Tronic keyboard with the Shift and ENTER keys in the traditional typewriter positions.

As a complete eight-user system, the USS 8/16 includes eight serial ports, six parallel ports, 64K of user-programmable ROM, and either a 20- or a 40-megabyte 5¼-inch Winchester hard disk. When used with the 8086, microprocessor addressable RAM capacity goes up to 1 full megabyte; with the 286, RAM can reach 4 megabytes. Files can be transferred between 5¼-inch and 8-inch floppies.

List price: base machine with 256K, four serial ports, two parallel ports, 5¼-inch and 8-inch floppy disk drives $4795; terminals $1000 each; 20-megabyte hard disk $2500; each additional ¼ megabyte $475. Octagon Computer Systems, 151 Bernal #5, San Jose, CA 95119, 408/262-7777.

Modems

Password with Telpac
A 300/1200 baud direct-connect, auto-dial auto-answer modem with supporting communications software. Password uses the PC's serial port. It weighs approximately 1 pound and is 6 inches long, 4 inches wide, and 1 inch high. Its circuitry uses only 12 ICs. Password features programmable auto-dial and auto-answer capabilities, auto-mode and auto-speed select functions, and an audio phone line monitor.



Password direct-connect modem, U.S. Robotics

Telpac is communications software that supports unattended operation. It requires 64K and one disk drive. It directs the computer through log-on and log-off procedures. *Telpac* enables the user to set up a directory of frequently used numbers for one- or two-touch dialing and can be used to set up passwords for limiting access. List price: Password $449, *Telpac* $79. U.S. Robotics, Inc., 1123 W. Washington Blvd., Chicago, IL 60607, 312/733-0497.

Network Devices

PCnet
A local area network product designed specifically for the IBM PC and MS-DOS. Its adapter fits into a single I/O slot. It requires 64K and one disk drive. The transmission media is a standard 75-ohm CATV coaxial cable that can run a maximum of 7000 feet. PCnet is a CSMA/CD network and transmits data at a rate of 1 megabit per second. PCnet software features include disk sharing, which allows PCs to share disks and printers, and file locking, which allows single-user applications to be converted to multiuser applications. It supports a variety of hard disks. List price: $695. AST Research, Inc., 2372 Morse Ave., Irvine, CA 92714, 714/540-1333.

Printers

DP-9725A
A dot matrix color printer that has graphics capabilities and four print quality modes: near-letter quality, correspondence quality, data processing quality, and condensed printing. The DP-9725A attaches via a parallel port or an RS-232C serial port. It features a four-color ribbon of red, yellow, blue, and black.

Because a different color can be selected for each pass of the printer, various color combinations are possible. The DP-9725A prints bar charts and curves with either 144 by 144 or 72 by 72 resolution. It prints 100 to 150 cps in correspondence quality mode and 200 cps in data processing mode. Condensed printing speeds are 150 and 164 cps at 15 and 16.4 cpi respectively.

The DP-9725A includes seven International Standard Organization (ISO) character sets as well as the standard 96-character ASCII set. It comes with a standard 1.5K buffer, and a 2K buffer is optional. The printer uses tractor paper feed and has a noise level of less than 55 dBA. Other features include left, right, and full justification; title centering; and proportional spacing. Options include subscript, superscript, scientific fonts, and bar codes. List price: $2350. Anadex, 9825 De Soto Ave., Chatsworth, CA 91311, 213/998-8010, TWX: 910-494-2761.

DP-6500
A dot matrix printer that employs an 18-needle printhead (two vertical columns of nine needles each) to achieve a print speed of 500 cps at 10 cpi.



DP-6500 dot matrix printer, Anadex

The DP-6500 can be attached to a PC via either a parallel printer port or an RS-232C serial port. It is capable of printing in a correspondence quality mode.

The printer includes seven International Standards Organization (ISO) character sets in addition to the standard 96-character ASCII set. A 4K buffer can be expanded in 4K increments to 16K. Either friction or tractor paper feed is available. The noise level is less than 60 dBA. List price: $2995. Anadex, 9825 De Soto Ave., Chatsworth, CA 91311, 213/998-8010, TWX: 910-494-2761.

Storage Devices

The Bank
A tape memory system designed to work with OmniNet that is capable of storing up to 200 megabytes of data. It requires a transporter board that fits into an I/O slot and 64K for initialization. The Bank's media is a continuous loop of 100-track magnetic tape encased in a cartridge and is available in 100- and 200-megabyte sizes.

The Bank uses the random access method of retrieving data. It can be used with one IBM PC or as part of an OmniNet network, as a backup system, or as a replacement for other types of mass storage. It has an average data access time of 10 seconds and a transfer rate of up to 1 megabyte per second. List price: $2195. Corvus Systems, 2029 O'Toole Ave., San Jose, CA 95131, 408/946-7700.

Magnabyte 10
A 10-megabyte add-on chassis that comes with a host adapter and uses any IBM PC slot. The Magnabyte 10 includes a disk controller, a power supply, a 10-megabyte Shugart hard disk drive, and a bay for an additional 10-megabyte hard disk. The supporting software includes a DOS 1.10 patch, a DOS 2.00 device driver,

For the next 30 days only we will match any price in this issue of PC World on any hardware or software products we now have in stock

There is only one number to call:

1-800-237-8977

In Florida call 1-813-786-1259

We will also give you an additional 10% off that advertised price just to introduce you to our toll-free total support.

The Systems Group

2340 State Route 580/Suite 234
Clearwater, Florida 33575
Telex 701484

There is only one catalog to have: our new, **free** 100 pages of the best in hardware and software. Send for your copy today!

IBM is a trademark of IBM Corporation
APPLE is a trademark of Apple Computer Inc.
TRS-80 is a trademark of The Radio Shack Division of Tandy Corporation
XEROX is a trademark of Xerox Corporation

Offer expires Oct 15, 1983.



Magnabyte 10 hard disk drive, Great Lakes Computer Peripherals

and a CP/M-86 patch. List price: $995. Great Lakes Computer Peripherals Company, P.O. Box 94789, Schaumburg, IL 60194, 312/961-9011.

Miscellaneous

Data Entry: Mouse, Voice, O.C.R.
Mouse Data Entry, Voice Data Entry, and O.C.R. (Optical Character Recognition) Data Entry are alternative entry devices that interface with Key Tronic's new IBM PC plug-compatible intelligent keyboard. Data entered with any of the three devices is transparent to the host because it is processed by the keyboard's 8088 microprocessor. The intelligent keyboard allows the devices to be used with any applications software.

The mouse comes in two versions: mechanical and optical. The optical mouse is operated on a special pad. The user trains the Voice Data Entry device to recognize one voice and a given vocabulary. The user also determines what string of characters is sent to the host computer for every word in the vocabulary.

The O.C.R. is designed to be used primarily in the banking industry, as it is programmed to recognize font on checks and magnetic coding on credit cards.

Both the Mouse Data Entry and the Voice Data Entry will be available during the last quarter of 1983. The O.C.R. Data Entry is currently available.

List price: O.C.R. $1400 without keyboard; combination package of Mouse Data Entry, Voice Data Entry, and keyboard $1200. Key Tronic Corporation, P.O. Box 14687, Spokane, WA 99214, 509/928-8000, TWX: 510-773-1885.

Command Control Mouse
An optically encoded mechanical mouse that can be used to edit, draw, or select menu choices. It requires a controller interface board. The user moves the cursor to any point on the display by sliding the hand-held mouse across a desktop surface. The three multifunction buttons are user assigned.



Command Control Mouse, WICO Corporation

The Command Control Mouse can be used with a word processor to add, delete, or reposition copy or to edit or scroll with a spreadsheet program. The mouse can also perform as an input device, a graphics plotter, or a game controller. It will be available during the last quarter of 1983. List price: $129.95. WICO Corporation, 6400 Gross Point Rd., Niles, IL 60648, 312/647-7500.

Polaroid Palette
A computer image recorder that produces presentation-quality color or black-and-white 35mm slides and instant photographs of PC graphics. The Palette plugs into the PC's serial port. It includes an exposure system, supporting software, an auto-advance 35mm camera back and adapter plate, a Polaroid 3¼ by 4¼ instant-print camera back, and a Polaroid/35mm auto-process transparency system hardware. It will be available during the last quarter of 1983. List price: Under $1500. Polaroid, 575 Technology Square, Cambridge, MA 02139, 617/577-2000.



Polaroid Palette computer image recorder, Polaroid

Systems Software

Languages

FORTH-32 2.0
A new version of the programming language that now runs under DOS 1.0, 1.10, and 2.00. FORTH-32 2.0 is three times as fast as the old program and has added utilities. It requires 64K, one disk drive, and a color graphics board for graphics applications. FORTH-32 uses a 32-bit ad-

dressing system that gives the user the ability to program over the entire megabyte of memory addressed by the 8086/8088 processor. It can be used as either an interpretive or a compiled language.

FORTH-32 allows users to define the input and output of the system; FORTH-32 will accept input from the keyboard or remotely from a serial port and direct output to the CRT, the serial port, or the parallel port. It performs both 16- and 32-bit computations, assuring numerical accuracy. The FORTH-32 floating point extensions provide the interface to an 8087 processor required to perform floating-point arithmetic.

Graphics commands allow the user to draw pictures, plot bar charts, create line graphs, or paint a closed curve. Sound generation and light pen/joystick interfaces are provided for developing games and music. Two screens can be edited simultaneously with the FORTH-32 dual-screen editor. List price: $185. Quest Research, Inc., 303 Williams Ave., Huntsville, AL 35801, 800/558-8088, 205/533-9405.

Logo
An interactive language that helps the user become familiar with programming concepts and logical, mathematical, and geometrical relationships. It requires 128K and one disk drive. The user can develop tutorials and demonstrations for learning purposes as well as applications that include graphics, mathematics, text handling, file manipulation, and assembly subroutines. Logo's turtle graphics, designed for young children (preschool through elementary), requires a color graphics monitor.

Logo features color turtle graphics, file handling, floating-point decimal mathematics, musical tone production, an assembly language interface, a full-screen editor, and two-display support. Text, graphics, or a mixture of both can be displayed on screen. Joysticks and paddles are supported. Logo will be available in December 1983. List price: $175. IBM, Systems Products Division, P.O. Box 1328, Boca Raton, FL 33432.

Utilities

LSH Package
Five integrated programs—*LSH, LXI, LED, LTF,* and *LMK*—that create a UNIX-like environment within the PC-DOS system. *LSH* is a UNIX-like command processor that implements a hierarchical file system in which files are organized by category. It requires 96K and two disk drives. DOS applications software can be used under *LSH*. The user can easily switch between DOS and *LSH*.

LXI makes 16 UNIX utilities, including *grep*, which can search the contents of several files for a specified text pattern available under PC-DOS. It requires 64K and one disk drive. *LXI* utilities can sort as well as search files, and debug programs.

LED is a UNIX-like line editor that has two modes, beginning and advanced. It requires 64K and one disk drive. In the advanced, or Magic, mode certain characters are given special meanings. *LED* can be used to edit programs, files, and text.

LTF is a text formatter that has a structure similar to *nroff*, the UNIX text formatter. It requires 64K and one disk drive. Text is keyed in, free form, with *LED* and formatted with *LTF* in accordance with the control commands the user embeds in the text file. *LTF* features boldface, underlining, centering, margins, headers, and footers.

LMK maintains multimodule projects such as manuals or programs. It requires 64K and one disk drive. The user specifies the aspects of the project, how they are related, and the action needed to complete the project. When an action is completed in one module, *LMK* updates the effect the action has on the other modules.

List price: complete package $229, *LSH* $99, *LXI* $54, *LED* $79, *LTF* $79, *LMK* $99. LXI Inc., P.O. Box 3032, West Lafayette, IN 47906, 317/423-2080.

Memory/Shift
A utility that creates a multitasking environment by loading up to nine programs into memory simultaneously. It requires 128K and one disk drive. Data from one program can be transferred to another. *Memory/Shift* supports two monitors simultaneously, enabling the user to view two programs at once. List price: $99. North American Business Systems, Inc., 642 Office Pkwy., St. Louis, MO 63141-7103, 800/325-1485, 314/432-6106.

Applications Software

Accounting and Inventory

Solomon III
A general ledger package written in C that requires 256K, two double-sided disk drives, and a 132-column printer. It features user-definable charts of accounts and journal types with no listing limitation. It also fea-

How to get a fast 300% return on your IBM-PC investment.

Compared with COBOL interpreters, mbp's new COBOL Compiler runs programs four times faster. With mbp on your IBM-PC, applications that used to take four hours now take one; that's like a 300% return on investment.

How is it possible?

Interpreters translate and execute a program one statement at a time, every time the program runs. mbp's COBOL Compiler generates machine language object code, so the entire program is translated only once; it then can be executed as often as you want in a fast single step—with no retranslation.

Gibson Mix: BENCHMARK RESULTS
Calculated S-Profile
(Representative COBOL statement mix)
Execution time ratio

mbp COBOL	COBOL X	COBOL Y
1.00	4.85	7.04

And it's COBOL—

the language for commercial and administrative applications. Standardized and maintained like no other language, now COBOL brings mainframe benefits to business microcomputer users.

mbp COBOL meets ANSI '74 Standard. It features a full range of utilities: 'Compiler Intelligence' automatically corrects simple syntax errors; Run-time Debug; Index Check and Array-Bound Inspection; listing options allow source and object code, map and cross-reference tracking. 500+ error messages insure user-friendliness. There is plenty of existing software, and maximum portability protects software investments.

Just $500.

Compare mbp's advantages, then compare prices; you'll be pleasantly surprised—again. Plus, application software developers can make up to 50 run-time package copies with no royalty charge.

mbp has twenty-five years worldwide software experience and twelve(+) in mainframe custom COBOL implementations. The mbp COBOL Compiler makes this valuable expertise available for micro users. Take advantage of it, and start getting a 300% return on investment, today.

mbp COBOL is available now

for the IBM-PC* or any microcomputer with MS-DOS,* iRMX-86,* or CP/M-86;* soon for OASIS-16.*

*IBM-PC is an IBM TM; MS-DOS, Microsoft TM; iRMX-86, Intel TM; CP/M-86, Digital Research TM, OASIS-16, Phase One Systems TM.



IBM-PC +



mbp COBOL.
300% faster–just $500.

mbp®

7700 Edgewater Drive, Suite 360
Oakland, CA 94621 Phone 415/632-1555

Please send me complete mbp COBOL information and performance data.

Name _____

Company _____

Address _____

City _____

State _____ Zip _____

Phone # _____

OEM & distributor arrangements available.

Reader Service #100

tures a user-definable accounting cycle with a capacity of 1 to 13 periods. The report generator can consolidate data from a number of *Solomon III* applications into one report.

Solomon III can be customized for any vertical market using the screen and forms generator that makes the screen look exactly the same as a company's business forms. *Solomon III* data can be converted to DIF file format and transferred to *VisiCalc* or *Multiplan* or other DIF applications. List price: $595. Computech Group Inc., P.O. Box 271, Frazer, PA 19355, 215/644-3344.

Business Management

The Business User's Solution
An integrated package of five programs: *Execu/File*, *Execu/Writer*, *Execu/Reporter*, *Execu/Model*, and *Execu/Plot*. It requires 128K (192 on the IBM PC XT) and two disk drives or a hard disk system. Data from any program can be integrated with any other program without reformatting or copying.

Execu/File is a data management program. *Execu/Writer* can be used for memos, letters, technical reports, and documents. Its editing capabilities include indentation and numbering of itemized lists and blocks of text, centering, underlining, and boldface. Names and addresses from *Execu/File* or *Execu/Model* can be used in form letters written in *Execu/Writer*.

Execu/Reporter sorts and selects data from *Execu/File* and formats reports according to the user's specifications. With *Execu/Model* the user can construct worksheets for budgeting, cost analysis, and planning requirements. *Execu/Plot* creates charts and graphs from the data in either *Execu/File* or *Execu/Model*.

List price: *Execu/File* and *Execu/Writer* $450, *Execu/Model* $200, *Execu/Reporter* $200, *Execu/Plot* price not announced. Executec Corporation, 12200 Park Central Dr., Dallas, TX 75251, 214/239-8080.

Communications

Personal Computer Data Interface (PCDI)
A multifunction communications program that provides telecommunications, data management, and graphic analysis. It requires 256K, one hard disk drive, a Hayes Smartmodem, and a color graphics board. *PCDI* is configured to communicate with IBM's VM/370 operating system and automatically retrieves data from the Compustat data base from Standard & Poors. It can be modified to access other data bases and operating systems.

PCDI is available in two versions: corporate and individual. The corporate version includes mainframe software and features automatic data retrieval. Data variables are menu selectable. *PCDI* automatically dials in and logs on to the mainframe. Data is transmitted back to the PC at either 300 or 1200 baud. The data management facility allows the user to manipulate data. The full-screen editor allows scrolling, global editing, and subsetting. The system tracks the user's data files. Data from *PCDI* can be translated into DIF format for use with *VisiCalc* and other DIF format applications. Up to 208 periods of data can be included in pie charts and histograms that are scrolled for viewing. Colors can be toggled and text can be incorporated.

The individual version is controlled manually. The user has to dial in to the data base and know how to list and retrieve data. Console spooling allows the data to be captured to disk.

List price: corporate version with a one-time license fee that allows as many copies as needed for use within the company $30,000; individual version $250 per copy. Applied Microsystems, Inc., P.O. Box 832, Roswell, GA 30077, 404/475-0832, 371-0832.

ReadiTerm
A package that provides communications with mainframes, The Source, CompuServe, Dow Jones, IBM PCs, and other micros. It requires 64K, one disk drive, a serial port, and a modem. With *ReadiTerm* the PC becomes a smart terminal capable of automatic dialing and log on, issuing predefined commands, capturing output, uploading, and downloading. *ReadiTerm* uses a universal protocol. Communications parameters can be customized and saved for future use. List price: $50. ReadiWare Systems, P.O. Box 680, West Redding, CT 06896, 203/431-3521.

SmarTerm/PC, TE400-FT
A Data General D100, D200, or D400 terminal emulator that requires 96K, two disk drives, and an asynchronous communications adapter. *SmarTerm/PC* allows the user to communicate with both minicomputers and other PCs. The user can transfer program and data files between the PC and the host computer system at speeds of up to 9600 baud.

The TE400-FT implements most of the Data General terminal's features, including multiple-display windows with independent vertical scrolling and window erase. It also implements character-display attributes such as underline, blink, dim, and reverse video.

The file transfer functions allow the user to capture data onto a disk file and transfer ASCII data to the host. The TE400-FT employs an error-free transmission protocol. It does not implement the D400's horizontal scrolling, compressed-character display, or foreign word processing character sets. Communications parameters are easily modified. List price: $125. Persoft, Inc., 2740 Ski Ln., Madison, WI 53713, 608/233-1000.

VisiAnswer and Answer/DB
A multiuser mainframe application that translates mainframe data into *VisiCalc* format. It requires 128K, two disk drives, and a communications board. *VisiAnswer* is installed in each IBM PC. *Answer/DB* is installed in the mainframe. The user is able to specify what mainframe data is needed for the task at hand by file, field, and range. *Answer/DB* extracts the specified data and sends it back to the PC, and *VisiAnswer* translates the data to a *VisiCalc* format. List price: $45,000 for a 50-station system. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134, 408/946-9000.

Data Management

Data Base Manager II
A data management program that is compatible with *VisiCalc*, *1-2-3*, *Multiplan*, and *WordStar*. It requires 128K and one double-sided disk drive. Data can be transferred from

3 WAYS TO BUY A WORD PROCESSOR

1. **Casually.** Buy the first program whose name you remember. [After all, they're pretty much the same.]
2. **Carefully.** Study comparison charts and function lists until your eyes glass over and your jaw goes slack--it's called Feature Shock. [After all that, they still look pretty much the same on paper.]
3. **Confidently.** Walk in to a store and ask to try the **Palantir Word Processor** first. Do look at a couple of others, just so you'll feel good about your choice. [After all, what's important in a word processor is how it feels. You'll spend a lot of time using it. You might as well enjoy using it.]

We recommend method 3. If the store doesn't carry **Palantir** yet, ask them to call us at Designer Software.

If you insist on method 2, we'll be happy to send you our features list and reviews. They're outstanding.

Still sold on method 1? Then remember, it's Pal-an-TEER.

Palantir Word Processor, any way you choose.

Palantir Word Processor runs under CP/M, PCDOS MSDOS, and equivalent operating systems. Palantir Word Processor and Designer Software trademarks of Palantir, Inc.

PALANTIR ™

Designer Software
3400 Montrose Blvd., Suite 718
Houston, TX 77006
(713) 520-8221
Reader Service #399

THE GREAT IBM COVER UP!

Tired of overreaching and confused by keyboard hieroglyphics?
COVER UP AND ENLARGE YOUR PC KEYS WITH ***KEYTOPS***™



- SIX FULL SIZE ***KEYTOPS*** THAT FIT OVER THE TOP OF EXISTING KEYS.
- Permanently stamped Return Enter, Tab, Back Space, O and both Shift keys - ends symbol confusion
- Increases accuracy and lessens operator frustrations.
- Installs in seconds, no permanent modification ***KEYTOPS*** can be removed at any time
- Available in IBM color or charcoal
- Some user comments
  "I am much more comfortable and more accurate now at the keyboard."
  "My secretary and I both feel they are an improvement."

Satisfaction guaranteed or money promptly refunded. Order your set now

APPLIED DYNAMICS — **P.O. Box 1810, Cottonwood, AZ 86326**
Dept W

NAME.....
ADDRESS.....
CITY..... STATE..... ZIP.....
Check or M.O. Enclosed Charge to Visa MC
Card # .....Exp. Date.....

Color preferred.
Charcoal ☐
IBM ☐

$18.95

Price includes first class mail. Az. residents add 5% tax.

VISA MasterCard
Visa and MC Call Weekdays
(602) 634-4507

Dealer inquiries invited

Reader Service #206

PC LINK™

THE FIRST AND ONLY INDEPENDENT STORE IN NYC DEDICATED TO IBM® PC SOFTWARE AND PERIPHERALS

IN STORE WE DEMONSTRATE MOST PRODUCTS WE SELL
BY APPOINTMENT ONLY

STORE HOURS: 9:00 A.M.—5:30 P.M. E.S.T MON.—FRI.

PC LINC CORP. 29 WEST 38TH ST., 2ND FL., NEW YORK, NY 10018

TANDON TM 100-2	**$239.00**
TANDON TM 50-2	**CALL**
LOTUS 1-2-3. (NO MAIL ORDERS ON LOTUS PLEASE)	**CALL**
TK SOLVER	**CALL**
QUAD LINK	**CALL**

BUSINESS SOFTWARE

APPLIED SOFTWARE	
VERSAFORM	$275.00
ASHTON-TATE	
dBASE II (PC DOS)	449.00
BOTTOM LINE STRATEGIST	319.00
FINANCIAL PLANNER	489.00
CONTINENTAL	
HOME ACCOUNTANT PLUS	95.00
FIRST CLASS MAIL	89.00
EAGLE SOFTWARE	
MONEY DECISIONS I & II	269.00
FOX & GELLER	
D. GRAPH	CALL
DIUTIL	CALL
QUICKCODE	CALL
HAYES	
SMARTCOM II	89.00
I U S	
EASY WRITER II	245.00
EASY SPELLER	139.00
EASY FILER	269.00
EASY PLANNER	189.00
LINK SYSTEMS	
DATAFAX	229.00
MICRO PRO	
CALCSTAR	CALL
INFOSTAR	CALL
WORDSTAR	CALL
WORDSTAR PROFESSIONAL	CALL
SPELLSTAR	CALL
MAILMERGE	CALL
MICROSOFT	
MULTIPLAN	199.00
PEACHTREE SOFTWARE	
PEACH GEN LEDGER	CALL
PEACH ACC RECV	CALL
PEACH ACC PAY	CALL
PEARLSOFT	
PERSONAL PEARL	190.00
SOFTWARE ARTS	
FINANCIAL MANAGEMENT	CALL
MECHANICAL ENGINEERING	CALL
SOFTWARE PUBLISHING	
P.F.S. REPORT	105.00
P.F.S. FILE	115.00
P.F.S. GRAPH	99.00
SORCIM	
SUPERCALC II	177.00
SOURCE	
SOURCE	75.00
SOUTHEASTERN	
DATA CAPTURE	115.00
T.M.Q.	
FILE FAX	145.00
TEXASOFT	
VERSATEXT	139.00

BUSINESS SOFTWARE Cont'd

VISICORP	
VISICALC	189.00
VISICALC ADVANCED	329.00
DESKTOP PLAN	219.00
VISIFILE	219.00
VISITREND/VISIPILOT	219.00

ENTERTAINMENT & EDUCATION

APPLE PANIC	$ 22.00
BUG OFF	29.00
COMPUTER FACTS AND FIVE	22.00
DEADLINE	39.00
FLIGHT SIMULATOR	35.00
FRIENDLY ARCADE	49.95
FRIENDLY PC INTRO SET	49.95
FROGGER	25.00
GORGON	29.00
HI RES #4	29.00
PC TUTOR	65.00
POOL 1.5	25.00
PROFESSIONAL BLACK JACK	60.00
SERPENTINE	25.00
SPACE STRIKE	25.00
STAR CROSS	29.00
SUSPENDED	39.00
ZORK I, II, III ea.	29.00
FUNTASTIC	
BIG TOP	29.00
COSMIC CRUSADERS	29.00
MASTER MINER	29.00
SNACK ATTACK II	29.00

(Call us for more games not listed here)

MONITORS

AMDEK 310A	$189.00
310G	179.00
COLOR I	CALL
COLOR II	CALL
NEC JC1203 RGB	759.00
QUADCHROME	CALL

DISKETTES

DYSAN	
S.S./D.D.	CALL
D.S./D.D.	CALL
KANGAROO (10 year warantee)	
S.S./D.D.	$ 22.95
D.S./D.D.	29.95
MAXELL	
S.S./S.D.	26.00
D.S./D.D.	44.00
VERBATIM (5 year waranlee)	
21144 HEAD/CLEAN KIT	10.50
S.S./D.D.	26.00
D.S./D.D.	37.00

HARD DISK DRIVES

CORVUS HARD DISK 6, 11, 20 MB	CALL

A very special "Thank You to all of our patrons who helped in the making of P.C. Link's opening such a grand success!

EXPANSION BOARDS

USI COMPUTER MULTIDISPLAY CARD	$379.00
64 RAM CHIPS	59.00
AST CARDS	CALL
MONTE CARLO CARD	CALL
I-C-MAGIC CHIP	CALL
QUADBOARD CARD	CALL
AMDEK MAI CARD	CALL

MODEMS

HAYES SMART MODEM	$205.00
HAYES SMART MODEM 1200	485.00
HAYES SMART MODEM 1200B	CALL

ACCESSORIES

CURTIS PRODUCTS		
	DISPLAY PEDESTAL	$ 65.00
	MONO CABLE	45.00
	KEYBOARD CABLE	35.00
DIABLO RIBBON		6.35
	EPSON	
	TWIN PAK RIBBONS 70/80	25.00
FLIP N FILE		24.50
KRAFT JOYSTICK		49.00
MBI JOYSTICK ADAPTER		12.00
DISKETTE CASES		2.95

PRINTERS

DIABLO P32 D-MATRIX		CALL
DIABLO P38 D-MATRIX		CALL
DIABLO 620		CALL
DIABLO 630		CALL
DIABLO 630 TRACTOR FEED		$249.00
C ITHO	PROWRITER 10P	390.00
	PROWRITER 10S	575.00
	PROWRITER 15P	665.00
	PROWRITER 15S	729.00
	STARWRITER F-10	1250.00
	TRACTOR FEED F-10	250.00
IDS	PRISM 80	CALL
	PRISM 132	CALL
OKIDATA	92P	649.00
	93P	1009.00
NEC	8023	479.00
SANYO PR5500 DAISY PRINTER		655.00
PRINTER CABLE/PARALLEL		35.00

All prices listed in this ad are valid till Sept. 30, 1983. ALL BRANDS ARE REGISTERED TRADEMARKS IBM IS A REGISTERED TRADEMARK OF IBM CORP

CALL TOLL FREE 800-221-0343 CORPORATE ACCOUNTS WELCOMED IN NEW YORK CALL 1-212-730-8036

TERMS AND CONDITIONS

All prices reflect 3% cash discount. We reserve the right to repair, replace or return to manufacturer for repair, all goods acknowledged faulty or damaged on receipt by customer. ***Customer must call for Return Authorization Number before returning any goods.*** Prompt attention will be given to all damaged and faulty returned goods. Any goods returned for credit are subject to 10% restocking charge, plus shipping charge. No returns for credit on any software. Customer must deal with the manufacturer directly if the customer finds any false claims made by the manufacturer. Prices subject to change without notice. All advertised products are from our present stock and subject to availability. All goods are shipped U.P.S. surface unless otherwise authorized by customer. Add 2% of price, or minimum of $3.00 for shipping. We do not ship C.O.D. Please allow one to two weeks for personal or corporate checks to clear. To expidite shipping, send money order, certified or cashier's check, or charge to your **VISA—MasterCard.** (Minimum charge $50.00) N.Y.C. add 8¼% sales tax. N.Y.S. add appropriate sales tax. ***Terms, conditions and prices differ in our store.*** Prices subject to change without notice.

the above applications programs to *Data Base Manager II* or from *Data Base Manager II* back to the applications program. Each record can hold up to 40 fields of 60 characters each. The program produces formatted reports automatically. It can merge partial or entire data bases.

According to the manufacturer *Data Base Manager II*'s sorting capabilities are disk oriented, which allows users to sort files larger than available memory. List price: $295. Alpha Software Corporation, 6 New England Executive Park, Burlington, MA 01803, 617/229-2924.

Entertainment

Big Top
An arcade-style one-player game that requires 64K, one disk drive, and a color graphics board. The player maneuvers Wendell the acrobat through a multiple-ring circus. Wendell climbs ladders, jumps over beach balls, and ducks cannonballs and knives while trying to capture the ringmaster's hat. A joystick is optional. Several skill levels are available, and the highest score is saved to disk. The keyboard is user configurable. List price: $39.95. Funtastic, Inc., 5-12 Wilde Ave., Drexel Hill, PA 19026, 215/622-5716.

Enchanter
A prose adventure game that requires 64K and one disk drive. Players journey through an abandoned castle while skill, logic, and the help of uncovered spell scrolls aid the player in overcoming Krill, the evil warlock. As time passes during the game, the players must eat, drink, and sleep or their powers will begin to fail. Infocom plans to make *Enchanter* the first in a trilogy of magical fantasy games. List price: $49.95. Infocom, Inc., 55 Wheeler St., Cambridge, MA 02138, 617/492-1031.

Planetfall
A prose adventure science fiction game that requires 64K and one disk drive. Players become members of a stellar patrol responsible for saving a planet. List price: $49.95. Infocom, Inc., 55 Wheeler St., Cambridge, MA 02138, 617/492-1031.

Pick That Tune
A tune-identification game that contains 100 pop, country and western, and children's tunes. It requires 64K and one disk drive. Players bid the number of notes they think they will need to identify a tune. Using the sound generator *Pick That Tune* plays the number of notes each player has bid, beginning with the lowest, until the tune has been picked. Up to ten people can play. Ten player files are automatically stored to disk. Additional packages of 100 tunes each are available. List price: $29.95. Swearingen Software, 6312 W. Little York # 197, Houston, TX 77088, 713/937-6410.

Graphics

Halo
A software development tool that has a number of color graphics subroutines written in assembly language. It requires 64K, one disk drive, and a graphics board. *Halo* is compatible with four add-on color graphics boards—the Scion, the Orchid, the Amdek, and the IBM Color/Graphics Adapter.

Halo's color graphics subroutines include line, plot, arc, box, circle, ellipse, and point primitives and single commands that create bar and pie charts. It interfaces with six programming languages: BASIC (Interpretive or Compiled), PASCAL, Lattice C, FORTRAN, and Assembly.

With *Halo*'s Pattern Fill and Dithering commands, which allow mixing of colors at one point, the user has a wide choice of textures and color mixes. The World Coordinates function allows the user to define a coordinate system that can differ from the coordinate system on the graphics board. *Halo*'s data compression techniques make animation and on-screen "slide shows" possible.

List price: $150 with one language interface, $100 for each additional interface, $200 for a BASIC interpreter/compiler combination, $350 for all six interfaces. Lifeboat Associates, 1651 Third Ave., New York, NY 10028, 212/860-0300, Telex: 640693, TWX: 710-581-2524.

Job and Industry Specific

Best-Crop
An agricultural management program designed specifically for the crop producer who has more than one farm to manage. It requires 128K and two disk drives. *Best-Crop* includes eight interlocking modules: farm setup, field setup, soil test, fertilizer recommendation, field notes, crop histories, budget cost, and utilities.

Best-Crop allows the grower to enter and retrieve as much as 3 years of data. It includes the ability to record and analyze soil fertility, view history of farms and fields, and measure how well any farm or field performs. Because the program records budget in-

It's simple. . .
CALL & SAVE MONEY
1-800-841-0860
CONVENIENT ORDER ENTRY
TELEMARKETING
TO SAVE YOU MONEY
SINCE 1978
We sell IBM-PC Compatables
EAGLE PC
COLUMBIA PORTABLE
CORONA PC
$CALL
TRS-80 COMPUTERS
Model 100. . . . . From '677
We carry the complete line of
TRS-80 COMPUTERS
$CALL
PRINTERS
EPSON
OKIDATA
SMITH CORONA
$ CALL $
Star
C. Itoh
TRS-80
QUADRAM CORPORATION
COMREX
Verbatim
MICROTEK
USI
Hayes
Novation
GRAPPLER+
AMDEK
Panasonic
FREE
• Discount Price List
• Information Kit
MICRO MANAGEMENT SYSTEMS
TELEMARKET DEPT. PCW
2803 THOMASVILLE RD. E.
CAIRO, GA. 31728
ALL PRODUCTS WE CARRY ARE BRAND NEW AND COVERED BY MANUFACTURER SPECIFIC WARRANTY PRICES AND PRODUCTS SUBJECT TO CHANGE WITHOUT NOTICE.
Man's Best Friend
Micro Management Systems, Inc.
Ga & Info 912-377-7120
Reader Service #386

Just Announced

formation, the farmer can maintain a profitable balance between cost and yield.

List price: $695. Agricultural Software Systems, Inc., 1216 Dawson Rd. #109, Albany, GA 31707, 912/431-1113.

LawSearch
A communications package for lawyers and accountants that gives the user access to Westlaw, a legal data base offered by West Publishing Company of St. Paul, Minnesota. It requires 96K, one disk drive, an RS-232C port, and a 1200 baud modem. *LawSearch* also emulates the Hazeltine 1520 terminal. With *LawSearch* the user can download and convert files to ASCII text format for word processing. It features forward and reverse scrolling. Communications parameters may be modified. List price: $350. Direct.Aid, 695-C S. Broadway, Boulder, CO 80303, 303/494-8265.

Word Processing

Blue
A multiwindow word processor that allows the user to edit and transfer data among eight files simultaneously. It requires 64K and one disk drive and works on either a monochrome or a color monitor. Each window's color, size, shape, and location are user definable. Keystroke macros let the user combine a commonly used sequence of commands and execute it as one command. Format macros let the user define frequently used formats and execute them with one command.

Blue's formatting features include right justification, automatic word wrap, search and replace, block and line move, copy, delete, and automatic pagination. List price: $150. Symmetric Software, 1805 Clemson St., San Bernardino, CA 92407, 714/887-8595.

VisiWord/VisiSpell
A word processor/spelling checker that is compatible with VisiCorp's other "Visi" programs: *VisiCalc, VisiFile,* and *Visi/ON*. It requires 192K, one disk drive, and DOS 1.10 or 2.00. A split-screen window feature allows the user to move or copy data from one document to another, such as from a *VisiCalc* print model to a *VisiWord* report. *VisiWord*'s format features include automatic word wrap, automatic pagination, headers and footers, block move/copy, delete, global search and replace, and microspace justification. Spooling enables the user to print one document while editing another.

VisiSpell includes a Master Dictionary of over 100,000 words and a Personal Dictionary that can be customized to include nondictionary words. Spelling Memory remembers a user's unique spelling and typing habits to help select the most likely correct spelling. *VisiSpell* highlights misspelled and repeated words, presents the most likely correct spelling, and allows the user to insert it with a single keystroke. Global replace is a *VisiSpell* feature. List price: *VisiWord* $375, *VisiSpell* $225. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134, 408/946-9000, Telex 172159.

Just Announced *uses information provided by manufacturers. It does not evaluate products or corroborate manufacturers' claims. Send a description and a photograph of your new product to* Just Announced, PC World, *555 De Haro St., San Francisco, CA 94107.*

Spell-It™ is the only spelling checker to offer more than just ABC's

A. Easy to use.

B. Inexpensive.

C. Or your money back.



$29.95*

*introductory price

Compatible with WordStar, EasyWriter, Volkswriter and many other word processors. CP/M-80 version requires: 56K, 2 drives and 80 x 24 cursor addressable terminal. PC-DOS and MS-DOS versions require: 64K, 2 drives and 80 column display.

*IBM is a trademark of International Business Machines Corporation. Spell-It is a trademark of Berzurk Systems
Wordstar is a trademark of MicroPro International. EasyWriter is a trademark of IUS. VolksWriter is a trademark of LifeTree Software, Inc.

B E R Z U R K
S Y S T E M S

1434 Parker Street • Berkeley, California 94702
415-652-4400 ext. 415 (Visa and MC orders only)
415-845-9462 Blue BOSS computer (300/1200 baud)

☐ Please send me more information on **Spell-It**

☐ "My computer's gone BERZURK" T-shirt
only $7.50 __S __M __L __XL

☐ Please send me _____ copies of **Spell-It** at $29.95 each.

☐ CP M 80 (8" SSSD) ☐ PC DOS ☐ MS DOS 2.0
disk format _____

Include $2.50 shipping and handling with each order. CA residents add tax. Foreign orders (US funds only) add an additional $10.00.

☐ Check for $ _____ enclosed
☐ Visa ☐ MasterCard

Card # _____

Exp. date _____ Interbank # (MC only) _____

Signature _____

Name (print) _____

Address _____

City _____ State _____ Zip _____

Information shouldn't take an age to get to you

Introducing the PC WORLD Reader Inquiry Service Card
A valuable free service to our readers providing a quick and easy reference to new products advertised in each issue of PC World

No more waiting for new product information that is neither "new" nor even very informative by the time it reaches you.

PC World now makes it more convenient than ever to receive prompt and pertinent information about any of the products you see advertised in our magazine.

We've even made it easier for you to compare products so you can find the one that's right for your needs.

We have included a Product Index in addition to an Advertiser Index.

So now you can refer to advertisers by checking the specific products that interest you the most. If you're in the market for a monitor, you'll find all the advertisers who are selling monitors listed in one place.

All you have to do is to circle the appropriate numbers on the postage-paid *PC World* Reader Inquiry Service Card found in this issue. Drop it in the mail today for the literature we'll send your way.



If you want to stay informed keep us in mind.
The PC World Reader Inquiry Service

Would you like further information on a product that's advertised in *PC World*?

Well, it's easy and best of all—FREE!

Just follow these simple instructions:

- Print or type your name and address on the attached card. One card per person, please.
- Circle the number(s) on the card corresponding to the Reader Service number in either the Advertiser Index or Product Index.
- Drop the card in a mailbox and wait to receive the literature that will be mailed to you free of charge from the manufacturer.

The address on the attached card is for product information only. Send editorial comments or inquiries to: *PC World*, 555 De Haro St., San Francisco, CA 94107.

PC WORLD
Reader Inquiry Service

PC WORLD

Name_____

Company_____

Address_____

City/State/Zip_____

Card valid through 11/29/83

(Zip code needed to insure delivery.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275
276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425
426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450

I/7

PC WORLD

Name_____

Company_____

Address_____

City/State/Zip_____

Card valid through 11/29/83

(Zip code needed to insure delivery.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275
276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425
426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450

I/7

PC WORLD

Reader Inquiry Service

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA.

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
P.O. Box 13897
Philadelphia, PA 19101

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA.

POSTAGE WILL BE PAID BY ADDRESSEE

PC World
P.O. Box 13897
Philadelphia, PA 19101

Products

Reader Service Number

Computers

33	Columbia Data Products, Inc., 88
	COMPAQ Computer Corporation, 131
48	Corona Data Systems, 60-61
212	Eagle Computer, 96
79	IBM Corporation, 8-9
361	Tandy Corporation, 79

Hardware

Boards

204	Amdek, 10
10	Apparat, Inc., 164
18	AST Research Inc., 32-34
358	Cogent, 95
47	Conographic Corporation, 98-99
213	Easitech Corporation, 80-81
77	Hercules Computer Technology, 235
223	IDEAssociates, Inc., 90-91
402	Interphase Corporation, 175
403	John Bell Engineering, Inc., 216
105	Microcode, 165
236	Microlog, Inc., 281
—	Microsoft Corporation, 14, 37
133	Orchid Technology, 290
135	Pasocom, 127
143	Plantronics, 388, IBC
151	Qubie' Distributing, 188-189
155	Raytronics, 306
167	Scion Corporation, 66-67
169	Sigma Designs, Inc., 220
254	STB Systems, Inc., 136-137
256	TAC, 28-29
187	Tall Tree Systems, 154
—	USI Computer Products, 195
267	Vista Computer Company, 158

Storage Devices

—	CMC International, 134-135
235	MicroXpress, 339
411	Pegasus, 194, 378
169	Sigma Designs, Inc., 220
188	Tallgrass Technologies Corporation, 12
187	Tall Tree Systems, 154

Reader Service Number

Monitors

390	Avtec Industries, Inc., 341
343	BMC USA, 97
305	California Computer Systems, 18

Printers, Plotters, and Typewriter Interfaces

387	Data Terminals and Communications, 179
368	Dynax, Inc., 161
84	Intek Manufacturing Company, 275
91	Leading Edge Products, Inc., IFC
124	NEC Home Electronics USA, 94
—	Qume, 4, 5
319	Star Micronics, 49
326	Teletex Communication Corporation, 171
285	Toshiba America, Inc., 16-17

Communications

24	Bizcomp, 172-173
49	Corvus System, 78
397	CXI, 65
221	Hayes Microcomputer Products, Inc., 52-53
271	Information Technologies Inc., 82
272	Intelligent Technologies International Corporation, 264-265
236	Microlog, Inc., 281
133	Orchid Technology, 290
164	Santa Clara Systems, Inc., 258
190	Tecmar, 74-75, BC
193	Ven-Tel Inc., 256

Miscellaneous

13	Ariel, 341
349	Caere Corporation, 40-41
66	Electronic Specialists, Inc., 343
229	Keytronic, 92
356	Media Systems Technology, Inc., 302-303
114	Micro Q Incorporated, 259
122	Mouse Systems, 159

Systems Software

Operating Systems

62	Digital Research, 13
163	RTCS Corporation, 298
301	Software Solutions, 218

Products

Reader Service Number	
	Utilities
31	Central Point Software, 233
—	Computer Shack Inc., 340
71	Fox & Geller, 36
74	Funk Software, 192
408	Manx Software Systems, 149
238	MLI Microsystems, 342
127	Peter Norton, 237
244	Phaser Systems, Inc., 197
—	Programming International, 292-293
410	Sofstyle, Inc., 130
249	Software Technology for Computers, 115, 116-117
400	Staton Associates, 344
255	Stemmos Ltd., 384
187	Tall Tree Systems, 154, 237
384	Tylog Systems, Inc., 87
278	Vault Corporation, 145
197	Watsoft Products, Inc., 342, 343
	Languages
406	Computer Innovations, Inc., 73
323	Harvard Associates, Inc., 128, 183
89	Laboratory Microsystems, 359
92	Lifeboat Associates, 234
231	Mark Williams Company, 254
100	MBP Software Systems Technology, 365
—	R.R. Software, 148
393	Software 128, 183

Applications Software

	General Business
—	Anderson-Bell, 204
14	Arlington Software Systems, 279
92	Lifeboat Associates, 234
279	Micro Business Applications, 317
233	Micro Data Base Systems, Inc., 289
382	MicroPro, 176-177
—	Scitor Corporation, 174
178	Software Publishing Corporation, 382-383
301	Software Solutions, 218
258	TCS Software, 342
277	Time Accountant, 341
311	Wadsworth Professional Software, 250
	Financial & Spreadsheets
37	Computech Group Incorporated, 381
269	Executive Software Inc., 193
409	Heritage Computing, Inc., 30-31
297	Micro-Tax, 48
379	Omega Microware, Inc., 50
321	Pacific Data Systems, Inc., 178
161	Rocky Mountain Software Systems, 262
357	Weiss Associates, Inc., 143
389	XQ Software, 51
	Job and Industry Specific
32	CMA-Microcomputer Division, 344
227	Guidance Software, 259
375	PSI Systems, 338
	Data Management
330	ABW Corp., 156-157
6	Alpha Software Corp., 1
335	Ashton-Tate, 22-23,147
398	Continental Software, 239
218	G.M.S. Systems, Inc., 187
225	Innovative Software, 62
297	Mathematica, Inc., 217
—	MicroRIM, 223
334	Programming International, 386
173	Softcraft, 237
301	Software Solutions, Inc., 218
	Word Processing/Text Editing
21	Berzurk Systems, 371
399	Designer Software, 367
228	IUS, 162-163
93	Lifetree Software, Inc., 190
275	Microstuf, 278
369	Microtype, 338
286	Peachtree Software, 54-55
145	Professional Software Inc., 118-119
165	Satellite Software International, 77
301	Software Solutions, 218
396	Softword Systems, 274
250	Sorcim Corporation, 2-3
	Mailing Lists
183	Sunward Systems, Inc., 340
	Communications
306	Genasys, 59
275	Microstuf, Inc., 278
128	Novell Data Inc., 323
142	Persoft Inc., 128
316	Phone 1, Inc., 343
166	Saturn Consulting Group, Inc., 340
	Graphics
378	Data Business Vision, Inc., 63

Reader Service Number	
309	Enertronics Research, Inc., 280
409	Heritage Computing, Inc., 30-31
225	Innovative Software, Inc., 288
39	MicroCAD, 343
—	MICROGRAFX, 342
239	Multisoft Corporation, 144

Educational, Personal, Entertainment & Misc. Software

Educational

7	American Training International, 20
—	Cdex Corporation, 93
398	Continental Software Support, 239
288	Courseware, Inc., 327
381	Designware, 133
94	Lightning Software, 299
318	Sophco, 149

Personal

314	DEG Software, 337
251	Silversoft, 222
363	Sundex, 300

Entertainment

—	Bluebush Incorporated, 247
—	Grid Soft Inc., 291
—	Mattel Electronics, Inc., 25, 27
308	SubLOGIC, 273

Miscellaneous

364	Sophco, 219
278	Vault Corporation, 145

General

Accessories

206	Applied Dynamics, 367
346	Brown Disc Manufacturing , Inc., 248
44	Computer-Mate, Inc., 160
	Curtis Manufacturing Company, Inc., 185
63	Dysan Corporation, 89
224	Inmac, 277
91	Leading Edge Products, Inc., IFC
284	Lifeline Information Systems, Inc., 146
101	MC/N, Inc., 71
336	PCA, 344
310	3M Data Recording, 76
327	Vidiom Media Supply, 344
—	Williams & Foltz, 155

Reader Service Number	

Services

362	Compuserve, 301
—	Development and Learning Center, 341
—	Safeware, 319

Books, Catalogs, and Periodicals

20	B. Dalton Bookseller, 377
298	CBS Educational & Professional Publishing, 263
391	Computer Entrepreneur Publishing, 221
220	Hayden Book Company, Inc., 191
82	InfoWorld, 329
88	Kennen Publishing, 319
383	Little, Brown & Co., 147
232	Mentor Computer Services, 311
299	Micro Information Publishing, 379
—	PC Demo, 387
246	Robert J. Brady Co., 325

Events

—	CRT Monarch, 308
29	EMCE, 186
—	Northeast Expositions, 21

Mail Order

2	Advanced Computer Products, 276
370	Alphanetics Software, 310
359	American Software Club, 309
205	Applied Computer Products, 236
36	COMPUSHACK, 334
377	Computer Store, 338
273	Compumail, 238
268	Computer Outlet, 252-253
58	Diamond Software Supply Co., 314
214	800 Software, 328
339	Excellonix, 344
373	Happy Computer, 385
108	Micro Flash, 326
237	MICROMAIL, 318
—	Micromatics, 59
386	Micro Management Systems, Inc., 370
112	Micromart, 330-331
118	Microware, 344
235	MicroXpress, 339
351	National Computer Products, 312
136	PC Connection, 260-261
242	PC Link Corp., 368
—	Programming International, 292-293
380	Rogue River Software, 385
404	Systems Group, 362
263	Warehouse Software, 336
252	Wholesale Suppliers, 344

Advertisers

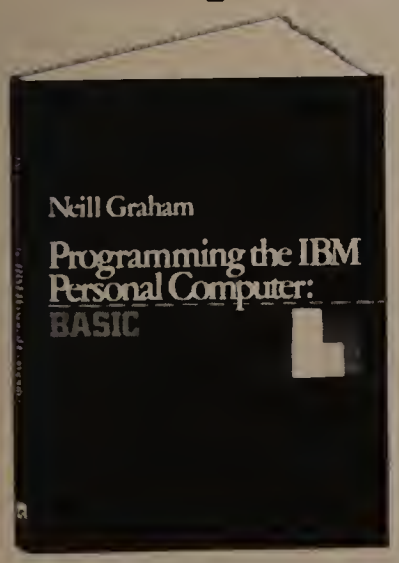
Reader Service Number	
330	ABW Corporation, 156-157
2	Advanced Computer Products, 276
315	Alloy Computer Products, 332
370	Alphanetics, 310
6	Alpha Software Corp., 1
204	Amdek Corporation, 10
359	American Software Club, 309
7	American Training International, 20
—	Anderson-Bell, 204
10	Apparat, Inc., 164
205	Applied Computer Products, 236
206	Applied Dynamics, 367
13	Ariel, 341
14	Arlington Software Systems, 279
335	Ashton-Tate, 22-23, 147
18	AST Research Inc., 32-35
390	Avtec Industries, 341
20	B. Dalton Bookseller, 377
374	Bay Technical Associates, 140
21	Berzurk Systems, 371
24	Bizcomp, 172-173
—	Bluebush Incorporated, 247
—	BMC USA, Inc., 97
346	Brown Disc Manufacturing, Inc., 248
401	Business Division, The, 251
349	Caere Corporation, 40-41
305	California Computer Systems, 18
298	CBS Educational & Professional Publishing, 263
325	Cdex Corporation, 93
31	Central Point Software, Inc., 233
32	CMA-Micro Computer Division, 344
—	CMC International (TARGA), 134-135
358	Cogent, 95
33	Columbia Data Products, Inc., 88
	COMPAQ Computer Corporation, 131
35	Comprehensive Software, 64
273	Compumail, 238
362	Compuserve, 301
36	COMPUSHACK, 334
37	Computech Group Incorporated, 381
391	Computer Entrepreneur, 221
406	Computer Innovations, 73
44	Computer-Mate Inc., 160
268	Computer Outlet, 252-253
—	Computer Shack, 340
377	Computer Store, 338
47	Conographic Corporation, 98-99

Reader Service Number	
276	Contemporary Computerwear, 338
398	Continental Software Co., 239
48	Corona Data Systems, 60-61
49	Corvus Systems, 78
288	Courseware, Inc., 327
	CRT/Monarch, 236, 308
	Curtis Manufacturing Company, 185
397	CXI, 65
378	Data Business Vision, Inc., 63
387	Data Terminals & Communication, 179
314	DEG Software, 337
399	Designer Software, 367
381	Designware, 133
—	Development & Learning Center, 341
58	Diamond Software Supply, 314
62	Digital Research, 13
368	Dynax, Inc., 161
63	Dysan Corporation, 89
212	Eagle Computer, 96
213	Easitech Corp., 80-81
214	800 Software, 328
66	Electronics Specialists, Inc., 343
29	EMCE, 186
309	Enertronics Research, Inc., 280
339	Excellonix, 344
269	Executive Software Inc., 193
71	Fox & Geller, Inc., 36
74	Funk Software, 192
306	Genasys Corporation, 59
218	G.M.S. Systems, Inc., 187
—	Grid Soft, 291
—	Guidance Software (Intran), 259
373	Happy Computer, The, 385
323	Harvard Associates, 128, 183
220	Hayden Book Company, Inc., 191
221	Hayes Microcomputer Products, 52-53
77	Hercules Computer Technology, 235
409	Heritage Computing, Inc., 30-31
79	IBM, 8-9
223	IDEAssociates, 90-91
271	Information Technologies, Inc. (ITI), 82
228	Information Unlimited Software (IUS), 162-163
82	InfoWorld, 329

Reader Service Number	
224	Inmac, 277
225	Innovative Software, 62, 288
84	Intek Manufacturing Company, 275
272	Intelligent Technologies International Corporation, 264-265
402	Interphase, 175
403	John Bell Engineering, Inc., 216
88	Kennen Publishing, 319
229	Keytronic, Inc., 92
89	Laboratory Microsystems, Inc., 359
91	Leading Edge Products, Inc., IFC
92	Lifeboat Associates, 234
284	Lifeline Information Systems, 146
93	Lifetree Software, Inc., 190
94	Lightning Software, 299
383	Little, Brown & Co., 147
408	Manx Software Systems, 149
231	Mark Williams Company, 254
—	Mathematica, Inc., 217
—	Mattel Electronics, Inc., 25, 27
100	MBP Software Systems Technology Inc., 365
101	MC/N, Inc., 71
352	Media Systems Technology, Inc., 302-303
232	Mentor Computer Services, 311
279	Micro Business Applications, 317
38	MicroCAD (Computer Aided Design), 343
105	Microcode, 165
233	Micro Data Base Systems, Inc., 289
108	Micro Flash, 326
332	MICROGRAFX (MGX), 342
299	Micro Information Publishing, 379
236	Microlog, Inc., 281
237	MICROMAIL, 318
386	Micro Management Systems, Inc., 370
112	Micro Mart, 330-331
—	Micromatics (Software of the Month Club), 59
382	MicroPro, 176-177
114	Micro Q Incorporated, 259

B. Dalton **The Source for Computer Books**

Indispensable Guides to the IBM Personal Computer



PROGRAMMING THE IBM PERSONAL COMPUTER: BASIC
Neill Graham

A complement to the BASIC manual supplied with your IBM personal computer. Learn how to use the features of BASIC to create your own programs. All you need are patience, practice, and this guide.

$17.50 paperback



YOUR IBM PERSONAL COMPUTER: *Use, Applications, and Basic*
David E. Cortesi

A comprehensive, practical, and accessible guide for the new owner of an IBM Personal Computer. Build a confident, productive partnership with your machine as quickly as possible, even if you've never used a personal computer before.

$17.50 paperback

Holt, Rinehart and Winston Available June, 1983

B. Dalton stocks a complete selection of computer books in 700 stores nationwide. Check your Yellow Pages for the B. Dalton Bookseller near you.

People who know computer books know

B. Dalton BOOKSELLER

To Order, Call Toll Free
1-800-328-3890 ext. 6013
In Minnesota 1-800-682-3816 x 6013 In Minneapolis/St. Paul 922-6699
In Alaska 1-907-276-3242 (store hours) In Puerto Rico 1-809-752-1275 (store hours)

Advertisers

Reader Service Number	
—	MicroRIM, 223
275	Microstuf, 278
—	Microsoft Corporation, 14, 37
292	MicroTax, 48
369	Microtype, 338
118	MicroWare, Inc., 344
235	MicroXpress, 339
238	MLI Microsystems, 342
122	Mouse Systems Corporation, 159
239	Multisoft Corp., 144
351	National Computer Products, 312
124	NEC Home Electronics (USA), 94
—	Northeast Expositions, 21
128	Novell Data Systems, Inc., 323
367	Okidata, 249
379	Omega Microware, 50
133	Orchid Technology, 290
321	Pacific Data Systems, 178
135	Pasocom, 127
336	PCA, 344
136	PC Connection, 260-261
—	PC-Demo, 387
242	PC Link Corp., 368
286	Peachtree Software Inc., 54-55
411	Pegasus, 194, 378
142	Persoft Inc., 128
127	Peter Norton, 237
244	Phaser Systems, Inc., 197
316	Phone 1, Inc. (Cleo), 343
143	Plantronics, 388, IBC
—	Programming International, 292-293
334	Programming International, 386
145	Professional Software, Inc., 118-119
375	PSI Systems, 338
151	Qubie' Distributing, 188-189
—	Qume, 4, 5
388	Rana Systems, 304
155	Raytronics, 306
246	Robert J. Brady Co., 325
161	Rocky Mountain Software Systems, 262
380	Rogue River Software, 385
—	R.R. Software, 148
163	RTCS Corporation, 298
—	Safeware, 319
164	Santa Clara Systems Inc., 258
165	Satellite Software International (SSI), 77
166	Saturn Consulting Group, Inc., 340
167	SCION Corporation, 66-67
—	Scitor Corporation, 174
169	Sigma Designs, Inc., 220
251	Silversoft, 222
410	Sofstyle, Inc., 130
173	Softcraft, 237
393	Software 128, 183
178	Software Publishing Corporation, 382-383
301	Software Solutions, Inc., 218
249	Software Technology for Computers, 115, 116-117
396	Softword Systems, 274
318	Sophco, 149
364	Sophco, 219
250	Sorcim Corporation, 2-3
319	Star Micronics, 49
400	Staton Associates, 344
254	STB Systems, Inc., 136-137
255	Stemmos Ltd., 384
308	SubLOGIC, 273
363	Sundex Corp., 300
183	Sunward Systems, Inc., 340
404	Systems Group, 362
256	TAC, 28-29
188	Tallgrass Technologies Corporation, 12
187	Tall Tree Systems, 154, 237
361	Tandy Corp., 79
258	TCS Software, 342
190	Tecmar Inc., 74-75, BC
326	Teletex Communications Corp., 171
277	Time Accountant, 341
285	Toshiba America, Inc., 16, 17
310	3M Data Recording, 76
384	Tylog Systems, 87
192	USI Computer Products, 195
278	Vault, 145
193	Ven-Tel Inc., 256
327	Vidiom Media Supply, 344
267	Vista Computer Company, Inc., 158
372	Wabash, 320
311	Wadsworth Professional Software, 250
263	Warehouse Software, 336
197	Watsoft Products, Inc., 342, 343
357	Weiss Associates, 143
252	Wholesale Suppliers, 344
—	Williams & Foltz, 155
389	X.Q. Software, 51

There are Currently 2,950 Products for the IBM® PC/XT

"The Software Guide"
for IBM PC/XT™
by Gerald Van Diver

FULL DESCRIPTIONS

ALL 2,950 TITLES
IN 1108 PAGES
IN A FULL 8½"x11" BOOK

AT ONLY $19.95

To order, fill out this coupon and mail now!

Name _____

Company _____ Title _____

Address _____

City _____ State _____ Zip _____

_____ Number of books $19.95 each $17.95 each for 2 or more (tax included). Please enclose $2.00 for each book ordered for postage and handling.

Send to: Micro-Information Publishing
15420 Eagle Creek Avenue
Prior Lake, Minnesota 55372
(612) 447-6959

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
☐ Visa ☐ MasterCard ☐ Check Enclosed

(monthly updates available)

IBM is a trademark of International Business Machines Corporation

Reader Service #299

INDEX

AGRICULTURE
Accounting
Production Planning
BUSINESS
Accounts Payable
Accounts Receivable
Budgeting
Calendar Schedule
Programs
Cash Disbursements
Cash Receipts
Financial Modelers
Planners
Fixed Assets Accounting
General Ledger
Graphics
Inventory
Integrated Accounting
Job Costing
Office Management
Order Entry
Payroll
Property and Real Estate Management
Medical Billing
Critical Path Method
Professional Time Accounting
Sports Management
Employment Agencies
Survey Analysis
Personnel
Checkbook Management
Investments
Insurance Management
Sales Analysis
Banking
Math Modelers
Business Tax
COMMUNICATION
Phone Modem Software
DATABASE PROGRAMS
EDUCATION
ELECTRONIC MAIL
ENGINEERING
Civil
Electrical
Industrial
Mechanical
Structural
Solar Energy
Design Calculation
Data Base
ENGINEERING/ARCHITECTURAL
ENGINEERING/CONSTRUCTION
Job Costing
Payroll
Project Management
FORMS GENERATORS
GAMES
Adventure Fantasy
Arcade
Sports
Strategy
GOVERNMENT/MUNICIPAL
GRAPHICS
Graphics
Character Generators
Shape Table Generators
LANGUAGES
Compilers
Interpreters
MAILING LISTS
MATH STATISTICS
MARINAS
MATH/ADVANCED
MEDICAL
NETWORKING
OFFICE MANAGEMENT
PERIPHERALS
PERSONAL HOME USE
Accounting
Tax
List Tracking
PLOTTING
PROGRAMMING AIDES
AND UTILITIES
Sorts
Programming Debugging Tools
Cross Reference
Assemblers Disassemblers
Compilers
Text Editors
REPORT GENERATORS
PROGRAM GENERATORS
SCREEN FORMATTERS
SOLAR ENERGY
APPLICATIONS
SPELLING CHECKERS
STATISTICAL ANALYSIS
STOCK MARKET
WORD PROCESSORS



You just bought an IBM XT. Now, how are you going to back up your 10 Mbyte hard disk? With 30 floppy disks?

Announcing a 25 Mbyte tape backup that will give you security and peace of mind in less than four minutes — and for only $995.

Your new 10 Mbyte hard disk system has solved your mass storage needs and you are using it to full advantage, pouring in new data. But all that data can be lost in an instant unless you back it up!

Sure, you can back it up with floppies. But do you know it takes up to 30 floppies to back up the full 10 Mbytes? That's time-consuming, not to mention cumbersome.

Pegasus figures the reason you bought your hard disk system in the first place was to save time and energy. For that matter, you wouldn't mind saving a little money in the process. That's why we're offering a free-standing 25 Mbyte tape backup chassis (with an extra bay for more storage, backup, or floppies). And we're offering it for only $995.

With the Pegasus tape backup system you don't have to sacrifice anything. Not quality, convenience, full factory warranty, or dealer support. Nothing.

Quality.

Pegasus uses Cipher ¼" cartridge tape drives. Cipher produces some of the finest tape drives in the industry and Pegasus uses only their very latest models. So even if you paid twice as much, you couldn't have a better drive.

Convenience.

With the Pegasus system you get the best of both worlds: a streaming tape cartridge for speed and, for convenience, the ability to address individual files just as you would with floppies when making corrections or restoring a single file.

Warranty.

The Pegasus tape backup system comes with a full one year warranty on parts and labor. If anything happens to your system during the warranty period, simply return it to your dealer for repairs at no charge.

Dealer support.

Chances are your system, which comes complete with everything you need to hook it up and start working, will require little in the way of additional information, warranty hassles, repairs, etc. But if you have questions or special needs, your dealer — and Pegasus — is there every step of the way.

And if you don't have a hard disk system yet . . .

If you've read this far and you don't even have a hard disk system yet, your patience and interest will be rewarded.

Pegasus has a complete 10 Mbyte hard disk system at the lowest price in the industry. For just $1495 the 10 Mbyte hard disk you've held out for is yours. It comes with a high quality 10 Mbyte hard disk, power supply, cables, software, host adapter, one year warranty, and yes, even the controller card. And our 23 Mbyte (formatted) hard disk comes complete for just $2249.

Soon from Pegasus.

And if 10 or 23 Mbytes of storage doesn't meet your needs, with just a little more patience you can buy one of our 65 or 140 Mbyte systems. Same high quality components. Same one year warranty. Same low pricing.

Who is Pegasus, anyway? And where do I get one?

Pegasus is the new kid on the block who decided that there were a lot of people out there who had big storage needs but were waiting for smaller prices. Now we're selling lots and lots of tape backup and hard disk systems, cutting our margins, and passing along the savings.

Where can you get a Pegasus? From your nearby computer dealer. In case your dealer doesn't have any Pegasus systems in stock — or can't keep them in stock — have him give us a call immediately so we can ship your unit out.

PEGASUS

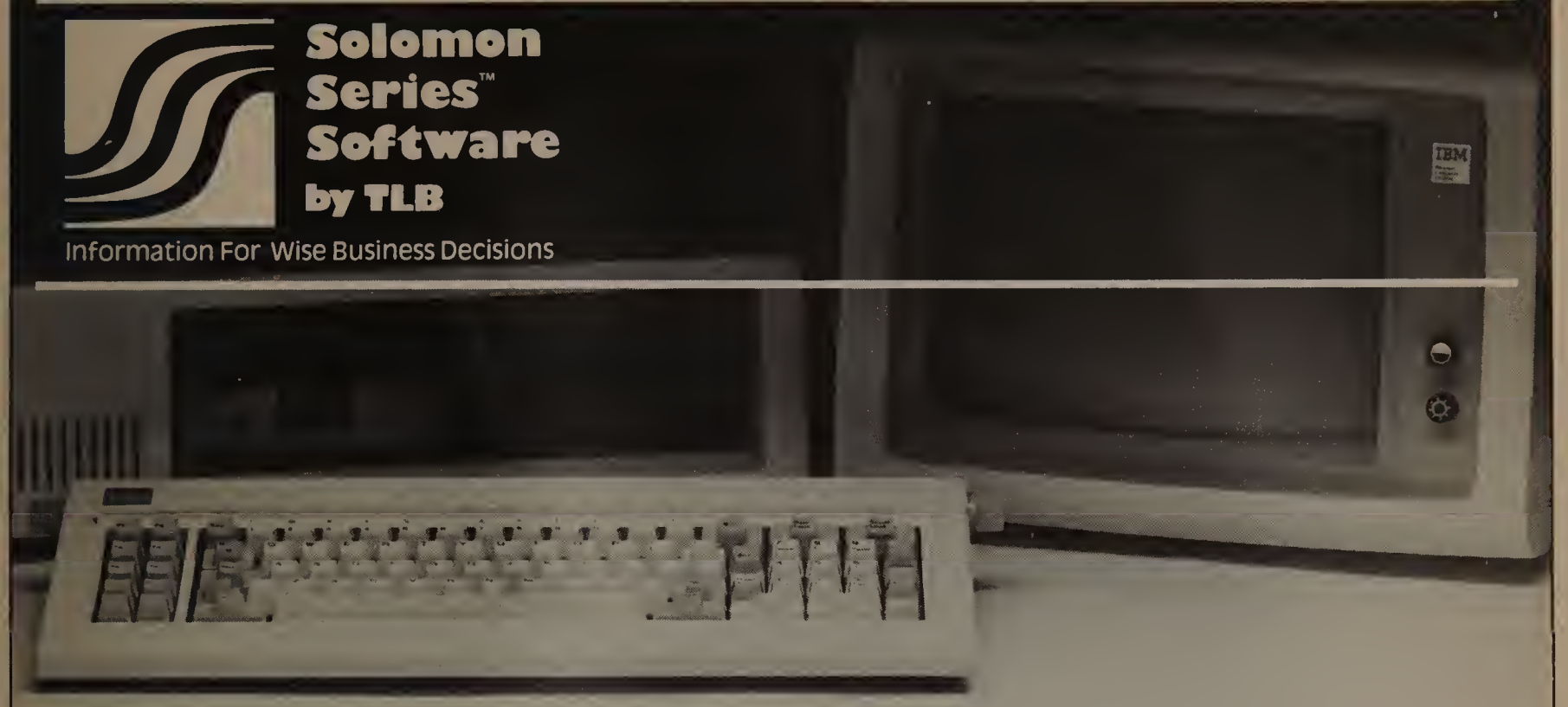
2200 West Higgins Road • Suite 245
Hoffman Estates, IL 60195 • (312) 843-1090

Dealer inquiries invited.

Reader Service #411

Solomon Series™ Software by TLB

Information For Wise Business Decisions



now SOLOMON Accounting Software is available for your IBM Personal Computer®

Solomon offers the most sophisticated accounting software system for microcomputers.

Easily set up, the remarkable Solomon software package operates from a single database managed by the MDBS™ database management system utilizing the industry standard operating system—CP/M™.

Solomon is faster, more powerful, more flexible, easier to install and easier to use than other systems.

The Solomon I System handles general ledger, payroll, accounts payable and receivable, invoicing, fixed assets, cash receipts and disbursements and address list maintenance.

The Solomon II System includes all these functions plus a job management package that can be used by engineers, architects, consultants, contractors and other service businesses.

Now you can have instant information for wise business decisions—with Solomon Series Software by TLB—from Computech.

Hardware requirements:
- 64K RAM
- Baby Blue™ CPU Card
- 132 Column Printer
- Hard Disk Recommended

IBM Personal Computer is a registered trademark of IBM.
MDBS is a registered trademark of Micro Data Base Systems, Inc.
CP/M is a registered trademark of Digital Research.
Baby Blue is a registered trademark of Xedex.

For information write or call (215) S·O·L·O·M·O·N or (215) 644-3344.

COMPUTECH GROUP INCORPORATED
Main Line Industrial Park
Lee Boulevard
Frazer, PA 19355

Ask for Solomon's Tutorial Package. Master Solomon in just hours.

Reader Service #37

IF YOU'RE CONFUSED ABOUT BUYING A PERSONAL COMPUTER, HERE'S SOME HELP.

Computers come in two parts.

One part is the "hardware," the machinery itself. The other is the "software," which tells a computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything. And vice versa. You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember it's the software that tells the computer what to do), it makes good sense to pick the software first.

Start by making a list of the things you want the computer to do. Possibilities include word processing, inventory control, accounting, graphics, recordkeeping—you name it, there's probably software that does it.

Next take your list into a computer store and ask the salesperson to demonstrate software that will do the things you want.

Even though you'll need a computer for the demonstration, keep in mind the computer is just a vehicle. The software is the driver. Once you've decided on software, picking the rest of the computer system will be that much easier.

The simpler the better.

Some people will tell you that software has to be complicated to be powerful. Nothing could be further from the truth.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you want to do without getting in the way.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

Simply see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask your friends who have them.

Or look at all the sales literature you can get your hands on.

But as helpful as that can be, there's no substitute for a live demonstration.

When you do go shopping, we recommend you take a look at the PFS® Family of Software.

Designed the way we think a software family should be: simple, straightforward and powerful.



Currently there are four software packages in the family: PFS:WRITE, PFS:FILE, PFS:REPORT and PFS: GRAPH, with more on the way. Here's a little more about each of them.

PFS:WRITE. The simplest way to get your message across.

PFS:WRITE is ideal for people who want to make their writing time more productive. It displays what you write on your computer screen so you can make revisions as you compose.

With WRITE, you can correct misspellings or substitute one portion of text for another, with just a few keystrokes.

And when you're through revising, WRITE shows you "on-screen" just how your document will look when it's printed. So there are no surprises afterwards.

WRITE also works with most popular software programs, including the PFS Family of Software.

This feature allows you to add names and addresses from mailing lists to generate form letters. Or combine columns of numbers or graphs with your text.

PFS:FILE. The simplest way to get organized.

FILE is basically a paper filing system without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

With FILE, you arrange your information on a "form" you design yourself. And when you need to track something down, FILE sorts through your records electronically. It lets you retrieve information in a variety of ways so you can be as selective as you want.

PFS:REPORT. The simplest way to sum it all up.

REPORT is a powerful analysis tool that works with FILE.

REPORT sorts through your files and retrieves the information you're looking for. Then assembles it all into one report, so you can analyze, plan and make better-informed decisions.

REPORT is also good at math. It quickly sorts through columns of numbers and performs calculations, so you won't have to.



PFS:GRAPH. The simplest way to spot trends.

GRAPH is ideally suited for professionals who need charts or graphs in a hurry.

All you do is specify the kind of graph or chart you want and enter the information. GRAPH does the rest.

GRAPH transforms columns of facts and figures into pie, line and bar charts so you can spot trends quickly and make better-informed decisions.

GRAPH works with PFS: WRITE, PFS:FILE, VisiCalc® files or data entered directly into the computer. And supports most popular printers and plotters.

Send for our Free PFS Software Catalog.

It'll tell you more about the PFS Family of Software and how to use it.

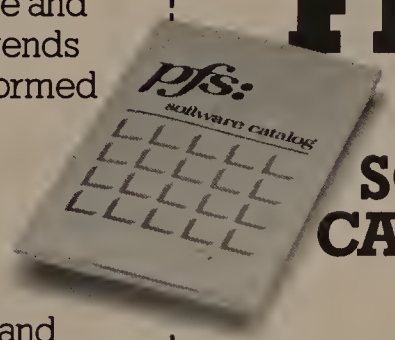
It's free. And all you have to do to get one is return the coupon below or see your participating PFS dealer.

The PFS Family of Software.

We've already made computers simpler to use.

Now we're making them simpler to buy.

pfs®:



FREE

PFS SOFTWARE CATALOG

PCW 6-3083

Name _____

Address _____

City _____

State _____ Zip _____

I plan to use a personal computer:
☐ at home ☐ at work ☐ both

Mail to: **PFS, 422 Aldo, Santa Clara, CA 95050**

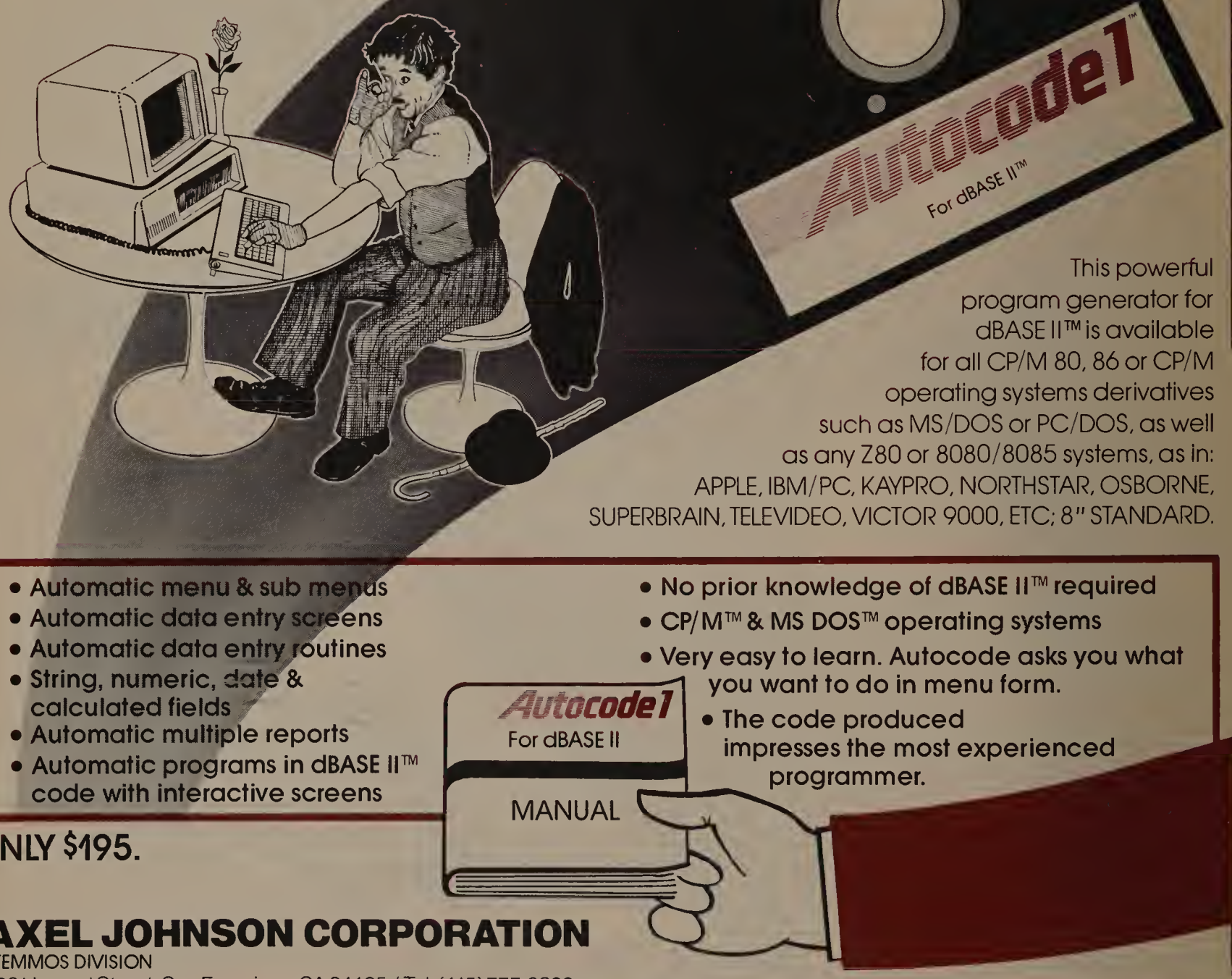
®PFS is a registered trademark of Software Publishing Corporation, 1901 Landings Drive, Mountain View, CA 94043. The PFS Family of Software currently runs on the Apple,® IBM,® Compaq,® Texas Instruments,® and equivalent personal computers.

Reader Service #178

Autocode:

The easiest way to get dBASE II to work for you– guaranteed.

IBM/PC VERSION NOW IN STOCK



This powerful program generator for dBASE II™ is available for all CP/M 80, 86 or CP/M operating systems derivatives such as MS/DOS or PC/DOS, as well as any Z80 or 8080/8085 systems, as in: APPLE, IBM/PC, KAYPRO, NORTHSTAR, OSBORNE, SUPERBRAIN, TELEVIDEO, VICTOR 9000, ETC; 8" STANDARD.

- Automatic menu & sub menus
- Automatic data entry screens
- Automatic data entry routines
- String, numeric, date & calculated fields
- Automatic multiple reports
- Automatic programs in dBASE II™ code with interactive screens
- No prior knowledge of dBASE II™ required
- CP/M™ & MS DOS™ operating systems
- Very easy to learn. Autocode asks you what you want to do in menu form.
- The code produced impresses the most experienced programmer.

ONLY $195.

AXEL JOHNSON CORPORATION

STEMMOS DIVISION
666 Howard Street, San Francisco, CA 94105 / Tel: (415) 777-3800

Just send the following to address above today.

- Your diskette format & hardware
- How many Autocodes you want at $195 each*
- Your name & complete address
- A check or money order.

*In CA add 6% sales tax

MasterCard VISA

Credit card buyers may substitute their card number and expiration date for the check. Or call us toll free and save the trip to the mail box.

IRONCLAD GUARANTEE

Try AUTOCODE Risk Free

The AUTOCODE 1 Program Generator you receive will be complete and unabridged. Use it for 30 days. If for any reason whatsoever you decide it's not for you, return it to us and we will gladly refund your money (less shipping). No questions asked

FOR ORDERS, TECH SUPPORT OR INQUIRIES: 800-262-8800

Or order toll free 800-227-1617 (Ext. 417) / In CA call 800-772-3545 (Ext. 417)

Dealer inquiries invited.

IBM is a registered trademark of International Business Machines, Inc dBASE II™ Ashton Tate CP/M is a registered trademark of Digital Research, Inc. Autocode 1™ Stemmos Ltd

Software at Affordable Prices!

IBM PC/XT Business Software

TRAINING

ATI $55 ea.

Amer. Training Int'l.
CP/M — Supercalc
MS-DOS — Multiplan
d Base II — VisiCalc
Wordstar
Training Programs
Include Disk & Handbook

ACCOUNTING

Home Acct. Plus	$ 89
Accounting Plus	
GL/AR/AP/Payroll	$349 ea.

GREAT PLAINS™

GL/AR/AP/Payroll	$349 ea.
Inventory (w/P.O. Sale)	$399
Micro-Tax	
Individual	$159
Professional	$599
Part./Corp.	$599
State	CALL
Aardvark	
Pro. Tax Plan	$249
Estate Tax Plan	$549

GRAPHICS

Chartman II	$319
Chart-Master	$289

SPREADSHEETS

MICROSOFT.

Multiplan	$179
VisiCalc	$158
Supercalc 2	$179

LOTUS 1-2-3 $349

Ferox

Micro DSS/F	$749
Micro DSS/A	$399
Consultant's Edge	$199
Graphpower	$259
Log on	$129

DATA BASE

Infostar	$259
Supersort II (CP/M 86)	$149
Condor III	$459

Ashton-Tate
dBASE II
$395

Bottom Line Strategist	$279
Friday	$249
Financial Planner	$449

Quickcode	$180
d Graph	$180
d Util	$ 60

WORD PROCESSING

MicroPro®

Wordstar	$259
Mailmerge	$139
Spellstar	$139
Star Index	$129
Wordstar Pro. All the Above	$379
Bibliography	$ 89
Grammatik	$ 55
Elect. Thesaurus	$109
Volkswriter	$139

HARDWARE

5¼" Winchester Disk Subsystem

Size	Complete	Drive Only
5MB	$1199	$ 775
10MB	$1399	$1075
15MB	$1649	$1289

STB™

Super Rio Card $529
One Parallel Port
One Game Port
Two Serial Ports
Clock/Calendar
Spooler/Emulator
256 K RAM

THE HAPPY COMPUTER
460 N. WOODWARD AVENUE
BIRMINGHAM, MI 48011

VISA-MASTERCHARGE
TO ORDER CALL: (313) 642-1454
INFORMATION: (313) 644-8921



FOR FAST DELIVERY
Send certified check or money order. Specify hardware manufacturer, operating system, disk size and format. Personal or company checks require one to three weeks to clear. Outside continental U.S. - add $10 plus air parcel post. Add $3.50 postage and handling per each item. Blue label $3.00 additional per item. Michigan residents add 4% sales tax. Mastercharge-Visa add 3% and include expiration date. Prices subject to change without notice. All items subject to availability. ®Mfgrs. Trademark.

Reader Service #373

SPF/PC™

ACTUALLY, there is no comparison. SPF/PC is the best full-screen editor available for the IBM Personal Computer.

It looks and works like IBM's large system SPF editor.

- SPF/PC can use up to 786K of memory as workspace.
- Word processing commands.
- 4-way scrolling.
- Split screen support.
- On-line help facility.
- Can edit up to 240 character records.
- Monochrome or color supported.
- Instantaneous screen display.
- Block Move/Copy/Repeat/Delete/Overlay/Shift/Exclude
- Automatic line numbering supported.
- 40 user-definable Program Function Keys.
- Direct interface to DOS commands for PCDOS 2.0 users.
- Browse sub-system.
- Move/Copy sub-system copies any file format.
- Utilities include: Rename/Delete/Print/Directory list.

AND MUCH MORE . . .

UPLOAD/DOWNLOAD sub-system available to SPF/PC users for $50.00.

$149.95 SPF/PC requires 128K, PCDOS, and 1 disk drive.

THE ODD-COUPLE™

Allows the APPLE and IBM/PC to communicate with each other.

- Connect APPLE to PC, APPLE to APPLE, and PC to PC.
- Transfer any file in either direction.
- CHAT mode allows direct communications through the keyboard.
- An Equipment Profile allows description of your operating environment.
- Communicate Direct or through a Modem at speeds up to 9600 baud (bps).
- Written entirely in machine language for speed and efficiency.

REQUIREMENTS:
APPLE — 48K, 1 disk drive, Serial Interface
IBM — 64K, 1 disk drive, Serial Interface

$79.95

For orders and dealer information write or call Rogue River Software, 2822 Tahitian Ave., Medford, OR 97504, (503) 779-3002. Mastercard/Visa, Check, or P.O. accepted. Add $5.00 for shipping. Canada $10.00. Foreign $15.00.

IBM is a registered trademark of International Business Machines, Inc. APPLE is a registered trademark of Apple Computer Inc.

Reader Service #380



Announcing

the most sophisticated database program development tools available on any personal computer anywhere.

The Database

ACCELERATOR™

Automatic program, screen, menu, report generation.
Automatically checks, formats, documents your programs.
Now available for the IBM PC at an introductory price of $195. 30 day money back guarantee.

from
Optimal Software

The Database Accelerator is a trademark of Optimal Software.

Distributed by Programming International
505 Hamilton Avenue, Suite 301, Palo Alto, CA 94301
(800) 222-8811 inside California: (415) 324-3730
Dealer inquiries welcome.

Reader Service #334

PC-DEMO

The smartest $6 you can spend on software

PC-Demo is unlike any other product you've seen before. PC-Demo is the first software demo subscription service. Subscribe to PC-Demo and each month we'll send you a diskette filled with software demos of the best newly-released software for the IBM PC.

PC-Demo is the perfect way for a new user to discover the variety of software available for the IBM PC. It is equally valuable for the experienced user who is tired of judging software by magazine ads and sales pitches. Software demos provide the hands-on interactive experience you need to get the real "feel" of a program. Many of our demos are modified but complete programs sold by manufacturers such as Microsoft, PC Software, and Fox & Geller.

A beginning subscription for three issues of PC-Demo costs just $18. That's right, only $6. for each single-sided "flippy" diskette containing 4 to 6 software demos, a useful program or two and some programming tips. What have you got to lose? Fill out the application form and sent it to us today.

The price per disk? **$6**

I know a good deal when I see one!

☐ I enclose $18 for 3 issues of PC-Demo
☐ Send me info on how I can get my software on PC-Demo.

name _____

address _____

city _____ state _____ zip _____

Send your check or money order to:

PC-Demo
1724 Sacramento, #444
San Francisco, CA 94109

THE DAZZLING, RICH COLORS IN THIS WORK OF ART CAN BE YOURS ...WITH NEW COLORPLUS.™

Just equip your IBM personal computer with COLORPLUS — the new color graphics adapter with the high resolution color professional use demands.

With COLORPLUS, you get the top quality graphics previously reserved for much more highly priced systems.

HOW YOU CAN GET DETAILED, ATTENTION COMMANDING COLOR GRAPHICS.

The accompanying work of computer art shows you COLORPLUS features that you can employ for your own charts, graphs and designs.

You can originate your own customized software package with up to 16 colors and up to 80 characters. Or you can acquire any of the existing software packages that take advantage of the COLORPLUS capabilities.

With custom packages, programmers will appreciate the overwrite capabilities of COLORPLUS, which allow application graphics to remain on the screen while source code is independently scrolled on the same screen.

DISCOVER THE POTENTIAL OF YOUR IBM PC! HERE'S HOW TO GET A FREE PRINT AND DEMONSTRATION.

Simply write to us at the address below. Or call toll-free 800-638-6211. We'll arrange for you to receive a FREE full-color reproduction, suitable for framing. We'll also tell you how you can get a FREE demonstration of COLORPLUS. Limit of one print per customer. Quantities are limited. Contact us today and find out how you can give your IBM PC the greatest enhancement you've ever seen.

PHT™ PRODUCTS

PLANTRONICS™
Frederick Electronics

7630 Hayward Road, P.O. Box 502 Frederick, MD 21701

Reader Service #143

About Our Gatefold

The image inside the gatefold cover was created by artist Mike Sullivan using an IBM PC, the Plantronics COLOR-PLUS card, and the *Color-Magic* graphics processor.

Mike is presently working as graphics director of International Software Marketing Limited, creator of *Color-Magic,* where he tests and demonstrates graphics on 13 different computers.

In creating this image, Mike began with a simple outline of Reggie Jackson at Yankee Stadium and used one of the special features of *Color-Magic,* the zoom mode, to enlarge sections of the screen up to 12 times the original size. The zoom mode helped display patterns and detail, such as the added reflection in Reggie's glasses. To perfect Reggie's stride Mike used the block option, which allowed him to pick up the bat and hand and move the image about an inch to the left. Once a section of the screen has been blocked off, the artist can also change the color with a choice of 16 true colors and a selection of pattern modes that can later be saved to disk for future work.

The Plantronics gatefold is a regular feature of *PC World.* Each month we ask an artist, an architect, or a designer to experiment with the system and create an image. At the end of the year a *PC World* blue-ribbon panel will evaluate the series and award a cash prize and a plaque to the artist who makes the most dazzling use of COLORPLUS. If you would like to be considered for the contest, please contact our editorial department.

YOUR IBM PC HAS HELPED YOU, TAUGHT YOU AND ENTERTAINED YOU.

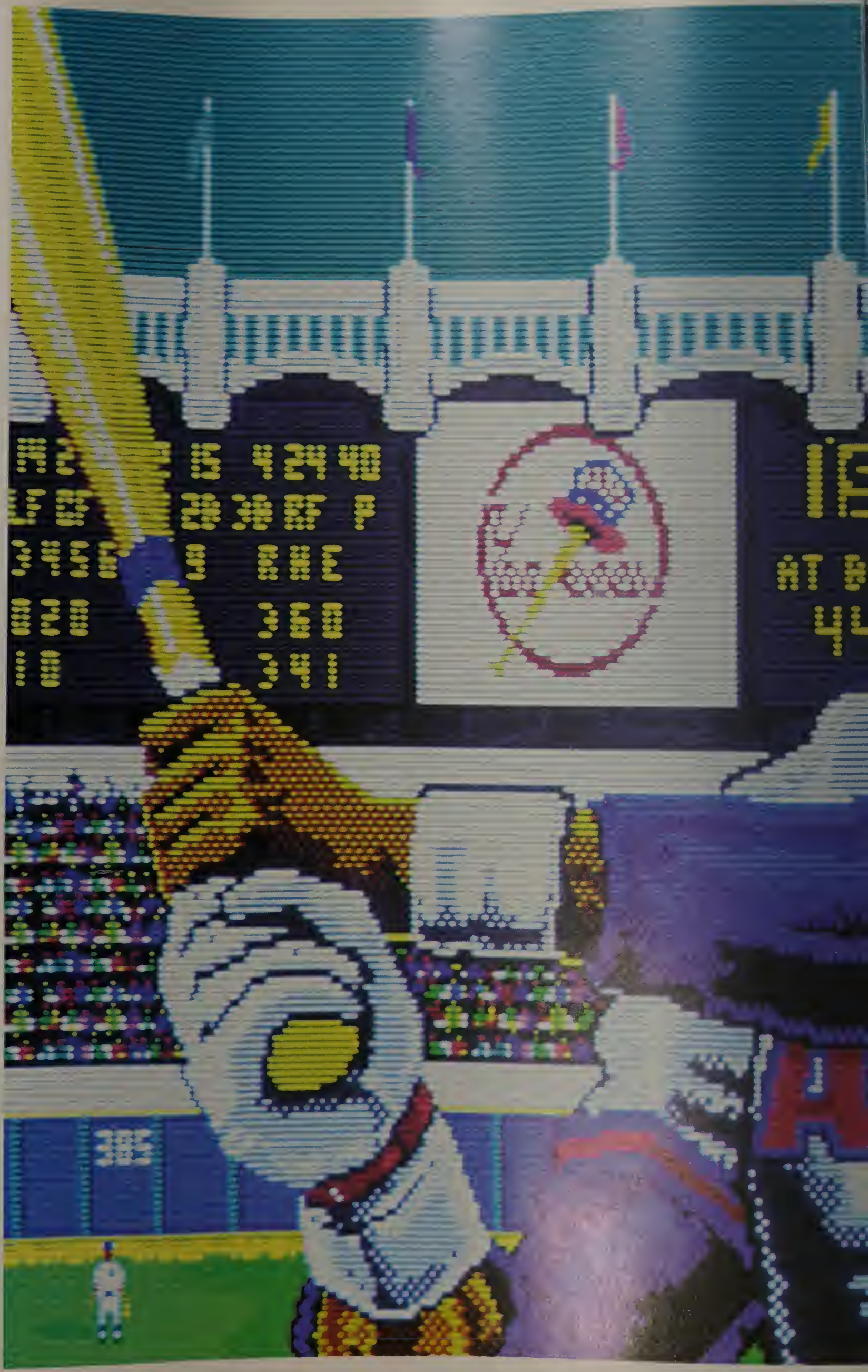
NOW LET IT DAZZLE YOU.

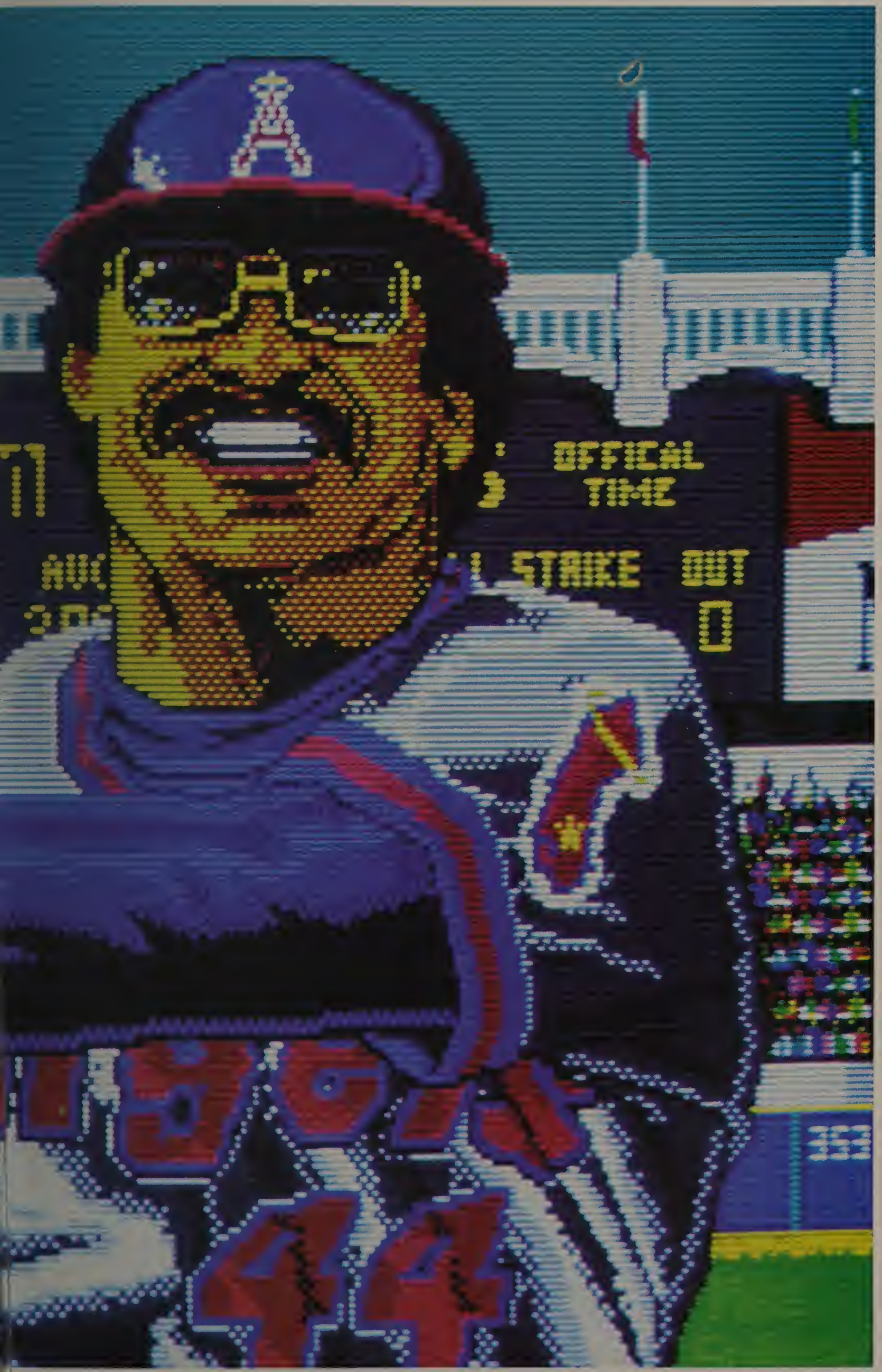
JUST OPEN THIS PAGE TO SEE WHAT COLORPLUS CAN DO FOR YOU!

PGF™ PRODUCTS

PLANTRONICS™
Frederick Electronics

Reader Service #143




OFFICIAL
TIME
STRIKE OUT
0
44

ELAN™* From TECMAR

The Most Powerful Local Area Network for the IBM PC

- Networking using Ethernet protocol
- Telephone support — autodial/autoanswer modem
- Voice recognition of commands and voice response
- Voice mail and messages
- Dictating system using Pearlcorder X-02 or XR from any telephone in the U.S.
- Complete software for written/voice mail, time management and audio/visual clock, calendar, and calculator functions
- Three ELAN Systems; the Secretary, the Manager and the Executive



The Manager

The MANAGER system adds a modem for telephone data communications and by adding a separate handset, will permit voice communications. The modem enables the MANAGER to receive unattended voice and data from any telephone in the U.S. Also, the MANAGER can accept commands through decoding the tones from the telephone keypad.



The Executive

The EXECUTIVE is the most complete implementation of ELAN, adding computer recognition of spoken commands. An executive might phone the PC to leave or retrieve messages or request specific information. The PC, in a spoken voice, can request a user's access code or prompt the user for a command. The executive can respond either by pushing buttons on the telephone, or by actually speaking back to the computer.

ELAN is designed to meet your total communications needs, including computer-to-computer (i.e., networking), person-to-computer, and person-to-person communication requirements for data and voice. The industry-standard high speed Ethernet network protocol is employed in ELAN, permitting many IBM Personal Computers to be linked together by ordinary thin coaxial cable. In addition to his own computer, an ELAN system user can access the other devices attached to the cable — such as printers and large disks.

All versions of ELAN include an Ethernet interface with equipment to convert voice into data and back again. This enables the user to give and receive spoken messages from any location as well as store them for later use. In addition, with the Executive version, all ELAN software packages can be operated through verbal commands, through the telephone keypad or through the IBM PC keyboard. The computer can then respond verbally, either by telephone or 'in person'.

The SECRETARY is the basic ELAN system. It includes an Ethernet interface and all other ELAN features except modem and voice recognition.

Whether you choose the EXECUTIVE, MANAGER or SECRETARY, an ELAN system will improve your productivity and expand the versatility of your IBM PC.



The Secretary

*ELAN (Extended Local Area Network) formerly ComNet

TECMAR 6225 Cochran Road, Cleveland, Ohio 44139, Phone (216) 349-0600, Telex 466692

Reader Service #190